

PUBLIC WORKS

*city
county
and state*

LEADERS IN THE PUBLIC WORKS FIELD



Eugene Reybold, formerly Chief of Engineers, is the new executive vice president of the American Road Builders' Association, succeeding Charles M. Upham who resigned recently. General Reybold, who retired from the Army in 1946, after 38 years of service, has long been prominent in engineering and in the equipment and construction fields. He will bring to this new field of work a broad experience and acquaintanceship with many phases of engineering. He holds the Distinguished Service Medal with Oak Leaf Cluster, and numerous engineering degrees. We congratulate the ARBA.

*June
1950*

*Engineers in Planning
Local Water Works*

*Survey of Sewage
Treatment in U. S.*

*How to Apply
For Surface Treatment*

*New Diesel Engines
Plant Efficiency*

*Georgia's Small Plants
Slow Surface Water*

*Electrical Heating for
Asphalt Storage Tanks*

88-H...99-H...MASTER 99



Every Pound of Weight is on a Wheel that

DRIVES and STEERS

That's why these husky graders, with their full hydraulic control, just naturally . . .

Go Places where ordinary graders cannot go.

Do Things ordinary graders cannot do.

Outperform ordinary graders on every job.

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U.S.A.



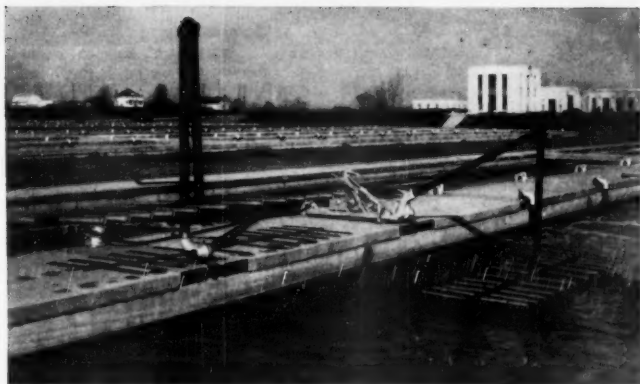
THE OVERWHELMING MAJORITY

specified "CHICAGO"

SWING DIFFUSERS AND PRECISION TUBES

Sewage Treatment Plant
Columbus, Ohio

Paul A. Uhlmann & Associates
ENGINEERS



THE overwhelming majority of Consulting and Design Engineers who planned equipment for Activated Sludge Sewage Treatment Plants in the past five years specified CHICAGO Swing Diffusers and Precision Diffuser

Tubes. It's a question of "Diffused Air Economics". Continuous operation of an Aeration Battery is possible only with Swing Diffusers. The most economical operation is possible with Precision Diffuser Tubes.

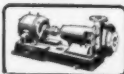
*What
Plant Operators
Say*

- Low first cost.
- Continuous performance without extra tanks.
- Economical operation—less power consumed—less labor.
- Tubes easily and economically cleaned.

WRITE FOR FULL ENGINEERING DETAILS
CHICAGO PUMP COMPANY
SEWAGE EQUIPMENT DIVISION

2300 WOLFRAM STREET

Flush Klean, Scrub-Peller, Plunger,
Horizontal and Vertical Non-Clogs
Water Seal Pumping Units, Samplers.

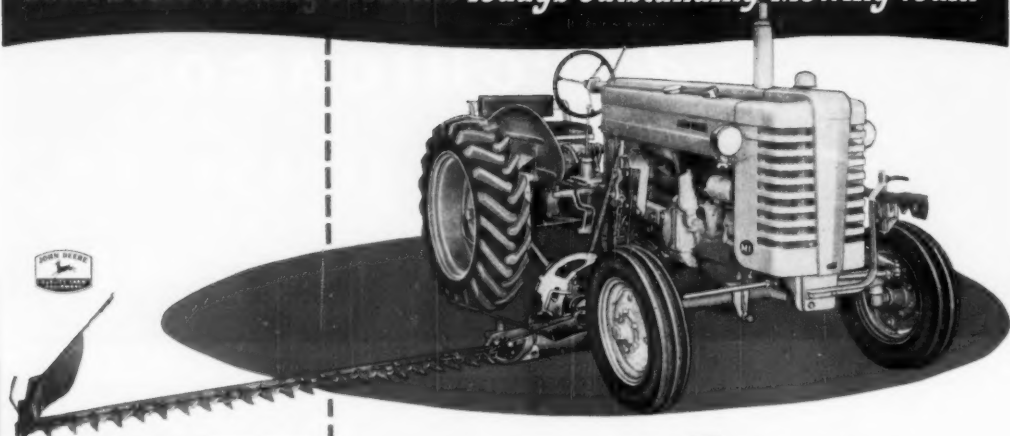


CHICAGO 18, ILLINOIS

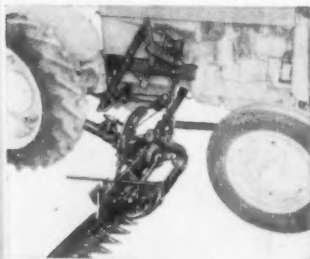
Swing Diffusers, Stationary Diffusers,
Mechanical Aerators, Combination
Aerator-Clarifiers, Comminutors.

When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.

John Deere Proudly Presents *Today's Outstanding Mowing Team*



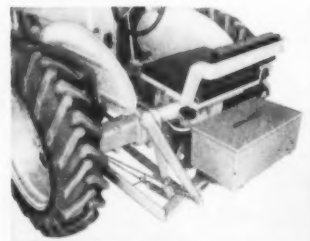
the New model **MI** Tractor and **MI-7** Integral Mower



* Here's the business end of the mower... simplicity itself. Pitman receives its power through V-belt drive.



* Note the neat, trim lines... the low, compact construction. Front lights are regular—sickle carrier extra.



* Red tail light and extra-large tool box are regular equipment.

There's new power and economy... new speed and stability that add up to top-notch performance on every mowing job when you use John Deere Model "MI" Tractors equipped with the new "MI-7" Side-Mounted Mowers.

Many Things New but John Deere Through and Through

Here at last is a modern outfit that's powered to handle your mowing jobs in a higher gear. The tractor is designed for rock-bottom operating and maintenance economy with the same simple, rugged, efficient two-cylinder engine as the John Deere Models "M" and "MT" Tractors—field-proved favorites on farms all over the country.

There's brand new experience in tractor maneuverability... in ease of handling. Steering through the adjustable steering wheel is virtually effortless... this tractor ducks in and out of corners quickly and easily... turns completely around in a radius of 8 feet! The air-cushion seat (regular equipment) provides real comfort for the operator.

Four Forward Speeds

Four forward speeds provide a speed for every job. The "MI" will creep

along at 1-5/8 miles per hour when mowing on extremely rough or steep ground and still maintain full cutter bar speed... whip along at a time-saving 12 miles per hour when transporting... 4 working speeds in all.

Sure-Footed as a Cat

In stability, the Model "MI" is unsurpassed. Here is sure-footed power that permits working where other tractors dare not go... here's low-down construction and proper weight distribution for mowing steep slopes.

Effortless Hydraulic Control

Dual Touch-o-matic provides fingertip precision hydraulic control of the cutter bar through its entire mowing range from vertical to 45 degrees below horizontal... raises and holds the inner shoe as high as 12 inches to handle curbside mowing.

Extra-tough cutting parts which stay sharp longer... a safety device which stops tractor engine as cutter bar swings back upon hitting an obstruction... and direct view of work are just a few of the extra-value, easier-operation features that mean better, faster mowing for more years.

Write today for full details

JOHN DEERE • Moline, Illinois

PUBLIC WORKS JOURNAL CORP.
310 East 45th St., New York 17, N.Y.

Officers

W. A. Hardenbergh, *President*
Croxtton Morris, *Vice Pres & Treas.*
A. Prescott Folwell, *Secretary*

Editors

A. Prescott Folwell
W. A. Hardenbergh

Assistant Editor

Edward B. Rodie

Editorial Assistant

Helen E. Quinn

General Manager

Croxtton Morris

Art Consultant

Nathaniel Pousette-Dart

Advertising Manager

Arthur K. Akers

Production Supervisor

I. James Barger

Circulation Supervisor

Edward B. Rodie

Published Monthly by Public Works Journal Corporation, Office of Publication at Orange, Conn. Editorial and Advertising offices at 310 East 45th Street, New York 17, N. Y. Subscription rates: U.S.A. and possessions, \$3.00. All other countries, \$4.00. Single copies 35¢ each, except special issues which are \$1. Acceptance under Section 3464 P. L. & R. Authorized.

THE ENGINEERING AUTHORITY IN THE CITY-COUNTY FIELD

Edited by

W. A. HARDENBERGH and A. PRESCOTT FOLWELL

CONTENTS

FOR JUNE, 1950

New Diesel Engine Raises Plant Efficiency	31
Sewage Treatment Plants and Methods	32
Oil Storage Tanks Are Electrically Heated. By W. A. Stancer	34
Small Plant Experiences with Surface Waters. By N. M. deJarnette	36
Aluminum Alloys in Sewage Treatment. By R. C. Kasser	39
How to Lay Tar Surface Treatments. By G. E. Martin	42
Factors in Planning Small Water Works	44
Liberty Builds an Incinerator	46
Controlling Sewer Insects and Sewer Odors. By Leon Gary	48
Effects of DDT on Persons	69
Mechanized Highway Maintenance	76

PUBLIC WORKS DIGESTS

The Sewerage and Refuse Digest	57
The Highway and Airport Digest	64
The Water Works Digest	70

PUBLIC WORKS MAGAZINE

Advertising Offices

New York 17, 310 East 45th St.
Arthur K. Akers, *Adv. Mgr.*
Burton M. Yost

Chicago 11, Ill.,

612 N. Michigan Ave.
Lewis C. Morris, *Western Mgr.*

Cleveland 10, Ohio, Villa Beach 2,

15445 Lake Shore Blvd.
Robert J. Shea, *Mgr.*

Dallas 6, Texas, 5241 Bonita Ave.

Francis J. Burt

Los Angeles 14, Calif.,

Halliburton Bldg., Suite 318
Simpson-Reilly, *Ltd.*

San Francisco 3, Calif.

Central Tower, Suite 814
Simpson-Reilly, *Ltd.*



Public Works T. M. Reg. U.S. Pat. Off.

Copyright 1950 by

Public Works Journal Corp.

PUBLIC WORKS ENGINEERING DATA

Industrial Waste Problems in San Francisco	54
Cost of Laying Water Pipe	55
Sedimentation Tank Performance	55
Preventing Edge Raveling of Asphalt Pavement	55
Dual Fuel Diesels Produce Larger Profits	55
Power from Sludge Gas	56
Average Bid Prices, FAP, 1949	56
Sludge Data from Detroit	56
Bottled Gas for Making Pipe Joints	56
A Jeep Equipped for All-Around Work	56
Grid Roller Reduces Pavement Salvage Costs	67
Safety for Center-Lining Crews	75
Safety Benefits in Bangor	75
Power Requirements for Pumping Sewage	77
Drainage for a Major Airport	77

DEPARTMENTS AND SECTIONS

Leaders in Public Works — Front Cover	14	Personal News	83
Letters to The Editor	20	Associations	83
Books in Brief	79	The Engineers' Library	85
Public Works Equipment	79	Worth Telling	
		By Arthur K. Akers	90



You can be sure that a manufacturer who devotes all his efforts on the production of one type of product alone will give you the best that he is capable of offering you. Because he concentrates his skill and talents—research and experiments—capital and labor investment on the one purpose, he puts all his faith in the success of that pursuit. He faces a competitive market, as it were, with one "shot" of ammunition—and he knows "it better be good" if he expects to survive. He must depend upon that hope and confidence in his enterprise that his single effort will be rewarded by your acceptance of his product.

Tubing is the only product of Wolverine Tube Division. It has been our product for over a quarter century.

While never overlooking the possibility of making our product better, we are also giving much attention to ways and means of bringing you greater benefits in the use of tubing through Customers' Engineering Service.

Wolverine tube is produced under one quality-control from ore to finished product. You can buy this non-ferrous seamless tube with absolute confidence.

Send for literature about the application of tube in your particular field.

THIS IS THE TUBING WE PRODUCE:

- Copper Refrigeration tube • Copper Water tube •
- Condenser tube • Automotive tube • Oil burner tube
- Capilator (the capillary tube used for restriction purposes) • Wolverine Trufin® (integral finned tube)
- S. P. S. pipe • A. G. A. tube

*Reg. U. S. Pat. Off.

Sold direct to manufacturers for original equipment and through wholesalers to plumbers and servicemen for replacement, as tradition dictates.

WOLVERINE TUBE DIVISION

Calumet & Hecla Consolidated Copper Company, Inc.

Manufacturers of seamless, non-ferrous tubing

1451 Central Avenue • Detroit 9, Michigan

Plants at Detroit, Mich. and Decatur, Ala.



Buy From Your Wholesaler

When writing, we will appreciate your mentioning PUBLIC WORKS

THE EDITOR'S PAGE

That Mechanical Garbage Man

MODERN mechanization can make, and in some cities has made, the job of the garbage collector pretty much a "white collar" position. In the same way, modern engineering has made sewage treatment plant operation far different than it was not so many years ago when some sewage plant operators looked—and smelled—like what they were.

But to get back to garbage and refuse: Roanoke, Va., has installed a number of those big metal containers, leak-proof, fly-proof and rat-proof, which can take all of the refuse from a hotel, restaurant or business place. It has a truck, equipped with a hoist for handling these containers. At regular periods, along comes the truck; it hooks on to the container and totes it off to the disposal plant. In Roanoke, the containers used have a capacity of 6 cubic yards, and the truck handles as many as 25 containers in an 8-hour day. By mechanization, one man collects 150 cu. yds. a day.

Mechanization has been slow in coming to the refuse collection and disposal field. We congratulate the pioneers who have developed this new and better equipment. They have made a notable contribution, not only in more effective sanitation, but also in the related factors of attracting higher grade personnel and reducing costs.

To These Engineering Graduates

ANOTHER group of young engineers will shortly graduate from our colleges to enter engineering work. Most of them have all of the formal education that they will ever get. From now on they are largely on their own, and it is pretty much up to each one to determine how far he (or she) will go. It is no longer as easy to find jobs as it was a year or two ago; there is more and tougher competition; and the pay is likely to be less. But there is still a marvelous opportunity in engineering for service and for personal satisfaction.

Granted good technical training, the personal qualities of character, resolution, imagination and initiative are deciding factors in getting ahead. Engineers are not overly blessed with the two latter qualities, for some reason or other; but we believe that they can be developed by determination and effort on the part of the individual.

Present-day engineers, tempered and developed by the pressures and responsibilities of the war years, are the best we have ever had. We bespeak the interest and the help of these engineers in making their successors even better. Engineers

have skills and abilities, not possessed by any other group, which are essential to the welfare and the advancement of our nation. It is the duty, and it should be the pleasure, of all engineers to contribute to the fullest extent to the development of these abilities.

We congratulate these young engineers on their selection of a profession, and we welcome them into our midst.

Mechanization Saves Money in Sewer Cleaning

A crew of four men, using equipment for mechanically cleaning built-in-place monolithic and the larger pipe sewers, performs six to eight times the work that the same crew did by hand methods. This is the experience of the Bureau of Street Repair of San Francisco, and the report goes on to state that, under previous conditions, cleaning was merely token service, except where actual sewer stoppages occurred. This situation, in the belief of the Director of Public Works, tended to reduce the capacity of the sewer system below design rating, and the question arises as to how much less sewer reconstruction might have been necessary if sewers had been properly cleaned during previous years.

Sewer cleaning is often one of the more neglected municipal engineering functions. It is pleasing to note that in some of our cities its importance is being recognized and its functioning is being placed on an efficient basis.

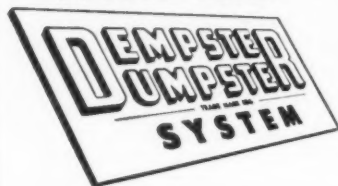
Safety Pays Cities

IN the 5 years from 1944 to 1948, San Diego, Calif., reduced lost-time injuries from 82.3 per million man hours to 21.5, according to the National Safety Council. Baltimore, Md., has reduced its annual compensation account charge by more than \$20,000 in nine years, and the accident frequency from 45.46 in 1948 to 27.45 in 1949. In 1949, the first year of its safety program, Oakland, Calif., reduced its accident frequency by 27%, representing a saving of more than \$100,000—saving a dollar for every 5 cents spent on employee accident prevention. In three years, West Palm Beach, Fla., has reduced the average cost of each employee injury from \$527 to \$137, principally by an organized safety program plus annual physical examinations. Akron, O., in twelve years reduced its workmen's compensation rate from \$2.28 per hundred dollars of payroll to 53 cents in 1949. All of these data are from the National Safety Council and they point the way to better management and lower cost of work.

Streets and Alleys Stay Clean Automatically—



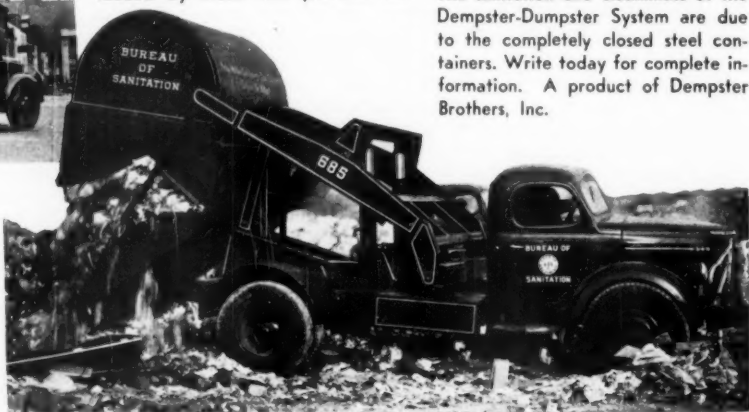
—With the



The amazingly simple stages of picking up, hauling and dumping a 10 cu. yd. Apartment Type container are shown in the three photos.

Cities, large and small, are doing what you can do to keep your streets and alleys free of rubbish, litter, rats, flies and scavengers . . . and at tremendous savings! Baltimore, Boston, Richmond, Birmingham, Pensacola and scores of other large and small municipalities have adopted this modern Dempster-Dumpster System by which one man and one truck hoisting unit serve a large number of detachable containers. These containers hold 8 to 10 cu. yds. of trash and rubbish, and, bear in mind, are always loaded by those who produce the

trash, ready for driver to haul away. If you use the old-fashioned, costly and unsanitary open truck method of collection, it will pay you to investigate the Dempster-Dumpster System. Containers are placed at convenient accumulation points at housing projects, schools, apartment and market areas, factories and down-town stores. When a container is filled, it is picked up by the truck hoisting unit and hauled to disposal area where container is automatically dumped by hydraulic controls at driver's seat. The sanitation and cleanliness of the Dempster-Dumpster System are due to the completely closed steel containers. Write today for complete information. A product of Dempster Brothers, Inc.



DEMPSTER BROTHERS, 960 Dempster Bldg., Knoxville 17, Tenn.

When writing, we will appreciate your mentioning PUBLIC WORKS



Lithographed on stone by Rockwell Kent

"Meet the customers' needs" has been our watchword for more than fifty years. Whether it's pipe seven feet, or a few inches, in diameter—or a complicated fitting—or a special casting—we have the equipment and the technical skills to meet almost any need for cast iron pressure pipe and fittings. Taking advantage of process developments and utilizing scientific methods to control quality, our plants are regularly manufacturing products that adequately meet our customers' exacting requirements. **United States Pipe and Foundry Company, General Offices: Burlington, N. J. Plants and Sales Offices Throughout U. S. A.**

U.S.
cast iron
PIPE

FOR WATER, GAS, SEWERAGE
AND INDUSTRIAL SERVICE



Without shock strength—or, for that matter—without all of the strength factors listed opposite—no pipe laid 100 years ago in city streets would be in service today.

But, in spite of the evolution of traffic from horse-drawn vehicles to heavy trucks and buses—and today's vast complexity of subway and underground utility services—cast iron gas and water mains, laid over a century ago, are serving in the streets of more than 30 cities in the United States and Canada.

Such service records prove that cast iron pipe combines all the strength factors of long life with ample margins of safety.

No pipe that is provably deficient in any of these strength factors should ever be laid in city streets. Cast Iron Pipe Research Association, Thos. F. Wolfe, Engineer, 122 So. Michigan Ave., Chicago 3.

CAST IRON PIPE

Strength factors of Long Life !

No pipe that is provably deficient in any of these strength factors should ever be laid in city streets

SHOCK STRENGTH



The toughness of cast iron pipe which enables it to withstand impact and traffic shocks, as well as the hazards in handling, is demonstrated by the Impact Test. While under hydrostatic pressure and the heavy blows from a 50 pound hammer, standard 6-inch cast iron pipe does not crack until the hammer is dropped 6 times on the same spot from progressively increased heights of 6 inches.

CRUSHING STRENGTH



The ability of cast iron pipe to withstand external loads imposed by heavy fill and unusual traffic loads is proved by the Ring Compression Test. Standard 6-inch cast iron pipe withstands a crushing weight of more than 14,000 lbs. per foot.

BEAM STRENGTH



When cast iron pipe is subjected to beam stress caused by soil settlement, or disturbance of soil by other utilities, or resting on an obstruction, tests prove that standard 6-inch cast iron pipe in 10-foot span sustains a load of 15,000 lbs.

BURSTING STRENGTH



In full length bursting tests standard 6-inch cast iron pipe withstands more than 2500 lbs. per square inch internal hydrostatic pressure, which proves ample ability to resist water-hammer or unusual working pressures.



SERVES FOR CENTURIES

REDUCE YOUR
REFUSE COLLECTION COST
WITH THE

LOW COST

St. Paul Pax-all REFUSE LOADER



The packing unit for any municipal budget

The price of the St. Paul Pax-all is much lower than you would think possible for this packing type refuse collection unit with its many advantages. Another important cost saving is that the Pax-all can be mounted on a lighter GVW chassis. Still a third saving is that installation of the Pax-all costs less. Maintenance and operating costs are lower. Use the coupon . . . get all the facts about the St. Paul Pax-all.

OTHER ADVANTAGES: Exclusive "Cram-Packing" feature means maximum payloads • Low loading height • Easily maneuverable in narrow alleys • Ideal load distribution in transit and dumping • Handles wet garbage and ashes as well as other refuse • Etc.

ST. PAUL DIVISION

Gar Wood Industries, Inc., 2207 University Avenue S.E.
Minneapolis 14, Minnesota

Please send me information on how the low cost St. Paul Pax-all will reduce refuse collection costs.

NAME _____
POSITION _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

ST. PAUL DIVISION
GAR WOOD INDUSTRIES, INC.
2207 University Avenue, S.E.
Minneapolis 14, Minnesota

Send It
Today!



Fast and Flexible . . .



INTERNATIONAL "Power on Wheels"

5 sizes and 7 models of INTERNATIONAL WHEEL TRACTORS

- Cub . . . 10 engine h.p.
- Super A, 20 engine h.p.
- I-4 . . . 29½ engine h.p.
- I-6 . . . 40½ engine h.p.
- ID-6 (diesel), 38½ engine h.p.
- I-9 . . . 55 engine h.p.
- ID-9 (diesel), 52 engine h.p.

The County of Santa Barbara, California, finds the International ID-6 to be a fast, flexible tool for highway repair work. With mounted front-end shovel, the ID-6 is shown here loading fill for road repair into trucks, at the rate of five yards in four minutes. The highly maneuverable tractor quickly loads the trucks and gets out of the way. Traffic is not blocked. The County gets this job done at very low operating cost with the ID-6.

Your International Industrial Power Distributor will show you how International "Power on Wheels" fits neatly into dozens of county and municipal operations. Because these tractors are cheap to operate, they help stretch budgets over more work-hours.

See your Distributor now about International Wheel Tractors—the fast, flexible units that mechanize maintenance and public works programs at lowest cost.

INTERNATIONAL HARVESTER COMPANY
Chicago

Tune in James Melton and "Harvest of Stars," NBC, Sunday afternoons

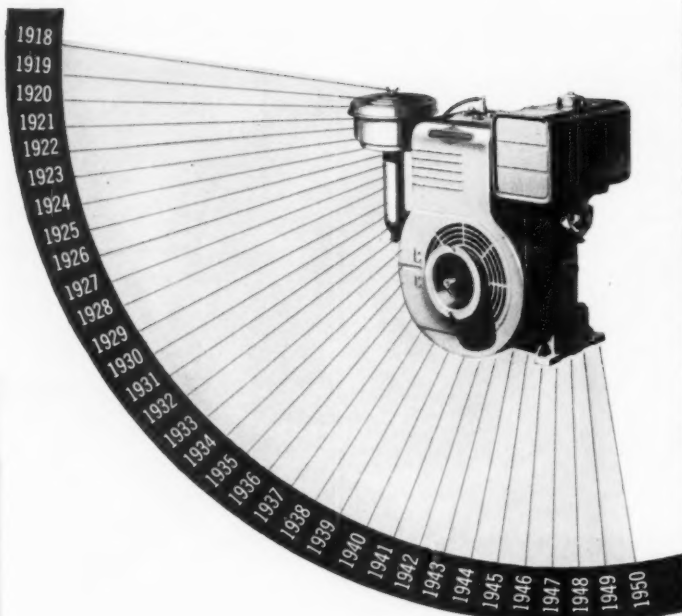
**Standardize
on Power
that Pays**



INTERNATIONAL INDUSTRIAL POWER

CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS

When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.



32 Years of "Air-Cooled" Power EXPERIENCE

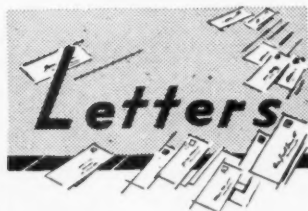
in Building More than 4½ Million Engines

Briggs & Stratton engines have, by far, more air-cooled power experience built into them than any other single-cylinder, 4-cycle, air-cooled engines.

BRIGGS & STRATTON CORPORATION
Milwaukee 1, Wis., U. S. A.



In the automotive field Briggs & Stratton is the recognized leader and world's largest producer of locks, keys and related equipment.



BLADING MAINTENANCE

Here is a copy of a letter to C. R. Melton of Havana, Ill. "I have long been interested in the same thing you are, and the possibility of getting a book that could be distributed among the operators and truck foremen appeals to me. Saw your note in the letter column of Public Works. I am enclosing a post card which I hope you will take time to fill out with the names and addresses of any sources of information you have received to date. Also I'm sending a copy of this letter to Public Works in case they have any leads."

That's a good column you have.

P. D. Carlson,
County Engineer,
Little Falls, Minn.

(Ed. Note: We have tried to furnish Mr. Carlson with the same material that we had sent to Mr. Melton.)

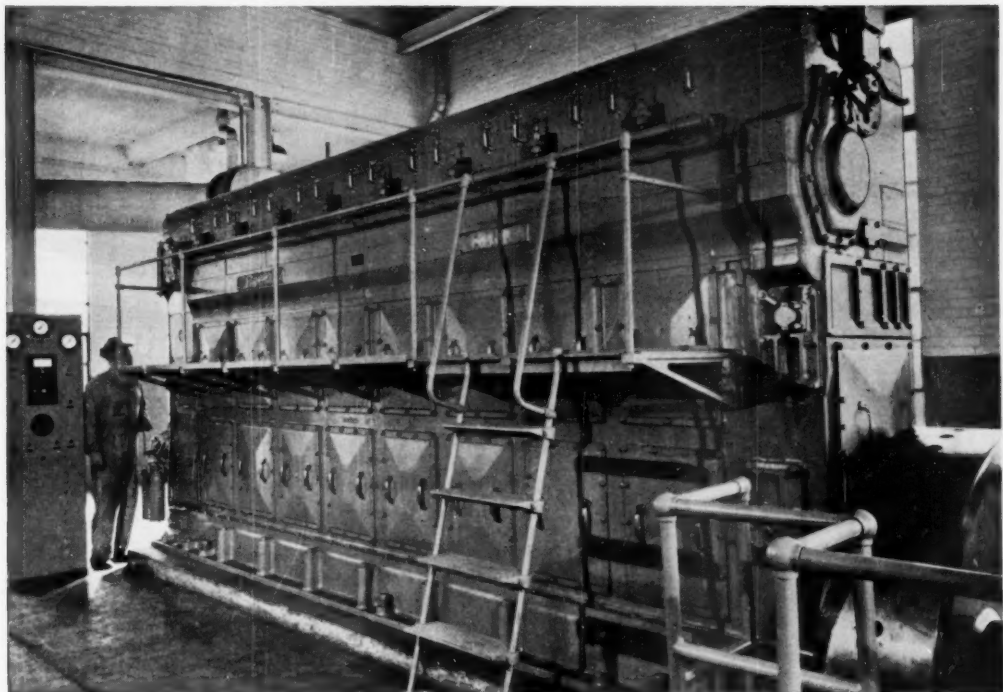
OUR APOLOGIES

On Page 30 of the March, 1950 issue of the PUBLIC WORKS magazine is an article written by A. R. MacPherson entitled "Deep Outfalls For Sewage and Sludge Disposal". We would appreciate your publishing this letter in an effort to correct several misstatements contained in the article.

The sewage disposal plant as outlined in the article was one method investigated and studied by the engineers in charge. This plan was discussed with the State Pollution Commission, but the plan was not approved by the Commission and has been completely abandoned by the City of Tacoma. However, the City will build at the approximate treatment plant site location shown on your map, but using a conventional primary treatment plant with the waste matter disposed of as fertilizer. The portions of your article dealing with the deep water outfalls are substantially correct, but the name of Tacoma's City Engineer is Mr. D. E. Morris.

Naturally, we are happy to have articles appear in your magazine that pertain to the City of Tacoma.

(Please turn to page 18)



Lower Cost Power From Standby Superior Results in a Full-Time Job

Folks in an Iowa City needed additional power for peak loads to supplement the two steam turbines in their Municipal Power Plant. To get this power economically they chose a Model 80 Supercharged Dual Fuel Superior.

In normal operation in this municipal system the Superior engine operates on gas. But when necessary, the Dual Fuel feature permits instant conversion from gas to oil. All the operator has to do is push a button to select the type of fuel. Mixing adjustments on Superior Dual Fuel engines are automatically controlled for any combination of fuels.

The plant engineers found that the Superior engine was producing electrical power cheaper than

the regular steam turbine units. As a result the standby unit was given a full-time job to reduce operating costs.

The remarkable success of this Superior engine application is not unusual. Chances are, the same results can be accomplished for you. A Superior representative will be glad to call at your convenience and show you how it can be done. In the meantime, write for your free copy of *Superior Diesel For Stationary Application*.

THE NATIONAL SUPPLY COMPANY SUPERIOR ENGINE DIVISION

Plant and General Sales Office: Springfield, Ohio



Superior
DIESELS

Locomotive • Marine • Oil Field • Stationary

When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.



THE JOBS IT CAN DO

WOULD FILL A BOOK

ALLIS-CHALMERS

HD-5

**...The Most Versatile
Tractor Ever Built**

**Engineered Completely New from the Ground Up •
with Big Tractor Design, Balance and Stamina**

Weight:

10,500 lbs. — 44" tread
11,250 lbs. — 60" tread

Speeds:

5 forward, to 5.47 m.p.h.
1 reverse, to 1.99 m.p.h.

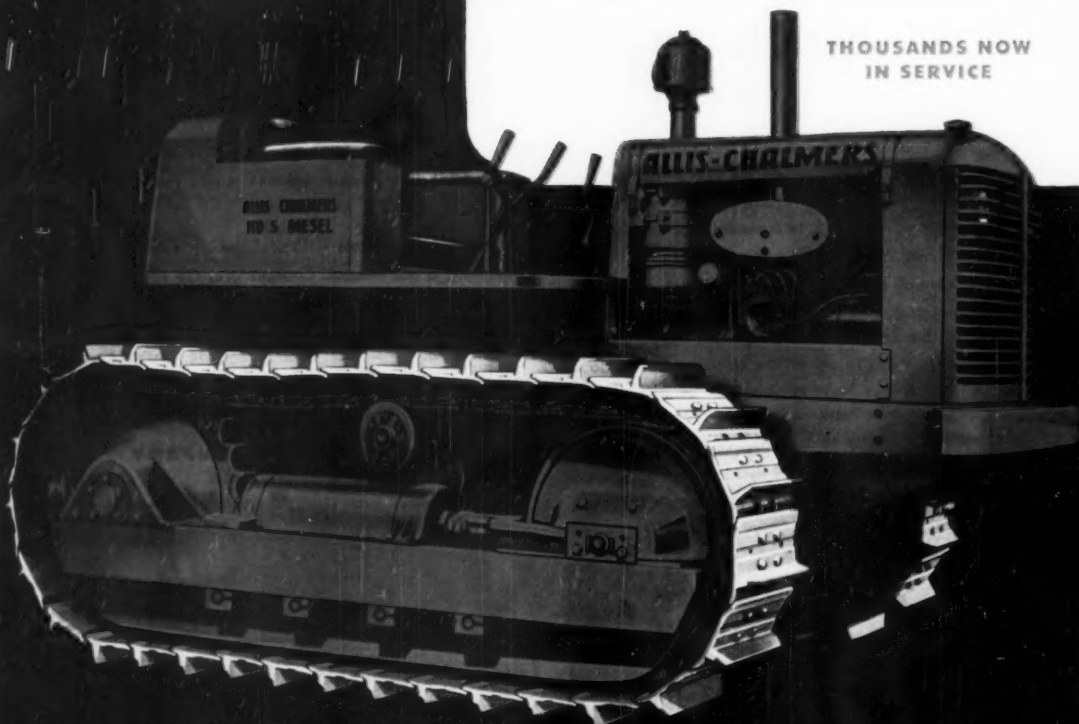
Horsepower:

40.26 drawbar

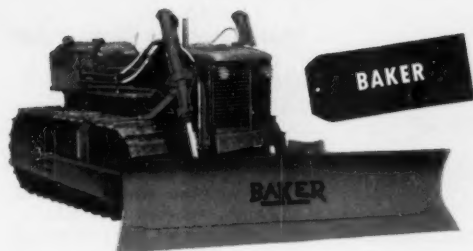
Engine:

General Motors 2-Cycle Diesel

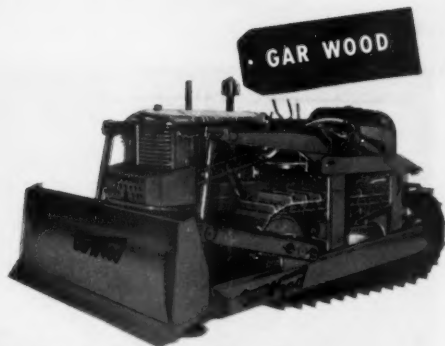
**THOUSANDS NOW
IN SERVICE**



NOT TIED DOWN TO SPECIALIZED DUTY — YET GIVES SPECIAL PERFORMANCE ON EVERY JOB



Hydraulic Bulldozers and Gradebuilders (track or engine-mounted models).
Root Ripper (interchangeable with bulldozer or gradebuilder moldboards).
Hydraulic "V" Snowplows with Wings.



Hydraulic Bulldozers and Dozercasters.
2-Wheel Hydraulic Scrapers. Hydraulic system optional.
Scraper can be hooked in with bulldozer or Tracto-Shovel hydraulic system.

**..with Its Wide Range of FULLY
MATCHED Allied Equipment**

Each Allied manufacturer, firmly established and skilled in his own field, worked in complete cooperation with Allis-Chalmers in the development of this auxiliary equipment.

Yes, the HD-5 with any Allied unit is a fully matched power package . . . matched for greater output at lower cost.



Straight and Angle Blade Hydrodozers.
Land-clearing Blades: alone or in combination with dirt-moving blades.
Logging Canopies.
Winches for construction, logging, oil fields, other operations.
Log Carts.
Tractor Cranes.



TRACTO-SHOVEL . . . with interchangeable attachments for handling a wide variety of jobs—dirt, material and rock-handling buckets, bucket teeth, bulldozer and angledozer blades, lift fork, crane hook, trench hoe, V-type snowplow, drag bucket, tine fork and rock fork.



SKID-LOADER . . . with interchangeable racks for transporting, loading and unloading pulpwood, logs, stumps, lumber, ties, slabs and edgings, slash, mine props and other wood.

"SEEING IS BELIEVING" . . . ASK YOUR ALLIS-CHALMERS DEALER FOR A DEMONSTRATION

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

For Greater Production . . .
For Easier Operation . . .
For Simplified Servicing . . .

**SUPERIOR IN EVERY WAY
DESIGNED TO PROVIDE ALL PRACTICAL
SHAPES QUICKLY AND EASILY**

DOWEL JOINT CURB FORMS
STRAIGHT, RIGID AND FLEXIBLE RADIUS CURB AND GUTTER FORMS
SIDEWALK FORMS

Heltzel
BUILDS IT BETTER



**SHAPES,
STANDARD
OR SPECIAL,
ARE EASILY MADE
FROM HELTZEL STEEL FORMS**

Compare Heltzel forms with any other make... the most rigid, the most completely engineered equipment obtainable... straight, radius, flexible and serpentine curbs and gutters and sidewalks are formed swiftly and economically with the barest minimum of labor where Heltzel forms are used. Let us send you complete information, including illustrations of the Heltzel line — ASK FOR BULLETIN A-20-G.

HELTZEL

**STEEL FORM & IRON CO.
WARREN, OHIO • U. S. A.**

(Letters — from page 14)

but because sewage disposal is of a controversial nature in some of the cities on Puget Sound we would appreciate your correcting the incorrect statements which appeared in the above referred to article.

Thanking you for this courtesy, I remain,

J. S. Roberts,
Commissioner of Public Works,
Tacoma, Washington.

WE BLUSH A LITTLE

I appreciate receiving your magazine. It is tops and I like it.

Tom S. Cathers,
City Engineer,
Marion, Ohio.

I enjoy greatly your magazine and the Manuals on Water, Sewerage and Streets. I have not received a recent Manual and would like to have one, if possible. The only thing of major proportion we plan this year are street improvements. We have just finished a major program of water and electrical improvements.

Virgil C. Knowles,
City Manager,
Holton, Kansas.

I look forward to each issue of Public Works because I always find very useful and valuable information in it.

J. W. Emberg,
City Engineer,
Madison, So. Dak.

I enjoy your magazine very much.

Edwin C. Shreve, Jr.,
Water Plant Operator,
St. Augustine, Fla.

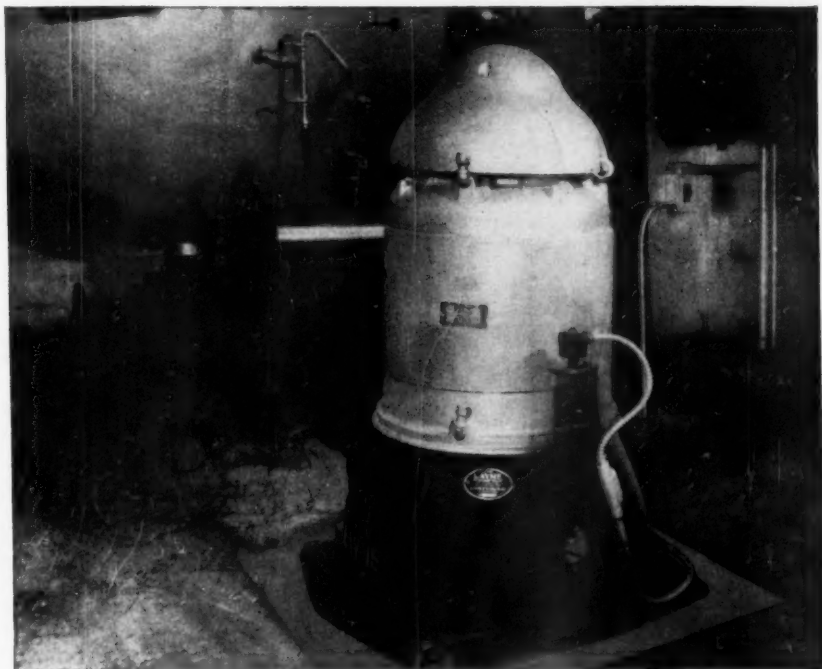
Your magazine is just about the best in the trade. I enjoy each copy of it and get a lot of help from it. In all the 10 or 12 years I have been receiving it, I have never seen a poor issue. Thanks a lot.

C. C. Lanford,
Supt. Commission of Public Works,
Greer, S. C.

Public Works contains much of value in our work. The magazine is placed in our library for reference by our design engineers and others and we very much want to continue to receive it.

Warren & Van Praag, Inc.,
Consulting Engineers,
Decatur, Ill.

(Ed. Note—We thank our readers for these comments, received during the past month).



Qualified -----

for any heavy production job

Scoring on three important points;— scientific design, rugged construction and proper installation, Layne Well Water Systems are generously qualified for the heaviest production jobs on record. Furthermore, once installed, these systems keep right on providing good service for years and years. Records show that upkeep cost, in the majority of installations, is almost non-existent. All installations are exclusively by Layne Associated Companies whose engineers and field crews

are widely experienced and thoroughly qualified. All contracts cover the job complete, including the final testing of the unit to assure Layne engineers and the buyer that the System is satisfactory in every way. For further information, catalogs, folders, bulletins etc., address

LAYNE & BOWLER, INC.
GENERAL OFFICES, MEMPHIS 8, TENN.

LAYNE ASSOCIATED COMPANIES

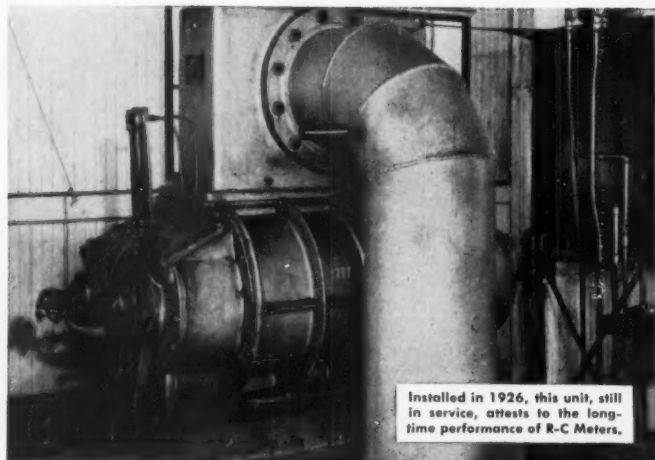
ASSOCIATED COMPANIES—Layne-Arkansas Co., Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Wash. ★ The Layne-Texas Co., Ltd., Houston, Tex. ★ Layne-Western Co., Kansas City, Mo. ★ Layne-Minnesota Co., Minneapolis, Minn. ★ International Water Corp., Pittsburgh, Pa. ★ International Water Supply, Ltd., London, Ont. ★ Layne-Hispano Americana, S.A., Mexico, D. F. ★ General Filter Company, Ames, Iowa.

LAYNE

WELL WATER SYSTEMS

VERTICAL TURBINE PUMPS

When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.



Installed in 1926, this unit, still in service, attests to the long-time performance of R-C Meters.

NO PENSION FOR THIS OLD-TIMER even after 23 years of service

Accurate and dependable as always, this 23-year-old Roots-Connorsville Meter still performs faithfully. No retirement for this veteran! Because new demands called for higher capacity, it has been transferred to another job in the same plant. Its old duties have been taken on by a new R-C unit, purchased because of fine performance of this old-timer.

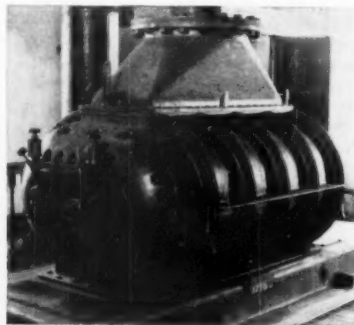
That's a common history of R-C Meters. They're built to measure accurately, and keep on doing it, year after year. Simple design, finely machined measuring surfaces and other important refinements account for their ability to measure gas accurately and unfailingly, almost indefinitely.

With 31 standard sizes and capacities from 4,000 to 1,000,000 cfh, R-C Meters meet the needs of most applications. Write for Bulletin 40-B-14 or tell us your specific requirements.

ROOTS-CONNERSVILLE BLOWER CORPORATION
506 Poplar Avenue, Connorsville, Indiana

(Right) This R-C Meter, with capacity of 317,000 cfh, replaced the "old-timer" above, now transferred to other duties.

(Below) Typical small capacity R-C Meter for low and medium pressures.



ROOTS-CONNERSVILLE

ONE OF THE DRESSER INDUSTRIES



BOOKS IN BRIEF

SOIL MAPS

Bulletin 22 covers the use of county soil maps and the profile method in soil survey practice. The bulletin also contains a paper on the use of such maps for making soil surveys, another paper on their use in connection with landing strips, and a tabulation showing the areas presently covered by such maps. Highway Research Board, 2101 Constitution Ave., Washington 25. \$1.80.

CRAWLER TRACTOR SERVICE MANUAL

A new 220-page Manual gives complete instructions for proper operation, maintenance and repair of the Allis-Chalmers HD-5 tractor. There are 23 sections, each devoted to a specific subject. \$3. Write Allis-Chalmers Mfg. Co., Tractor Division Service Dept., Box 512, Milwaukee 1, Wisc.

NOMOGRAM INDEX

The nomograms in this book cover a wide range of fields: Chemistry, mathematics, physics, electricity, hydraulics, power, aeronautics, water supply, sewerage, heating, painting, building, surveying, and many others. In all, this book gives the location and content of 1,700 such diagrams published in technical journals. John Wiley & Sons, Inc., New York. \$4.

HYDROLOGY

In this book, 24 experts have contributed their knowledge of hydrological problems under the direction of O. E. Meinzer. It covers distribution of rainfall, effects of wind and heat, water table fluctuations, soil moisture, flood control and related factors. 712 pages, 165 illustrations, 23 tables; Dover Publications, Inc., 1780 Broadway, New York, \$4.95.

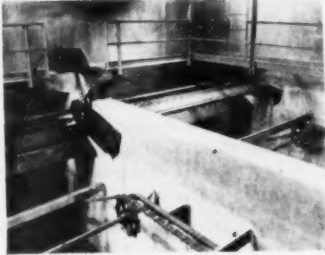
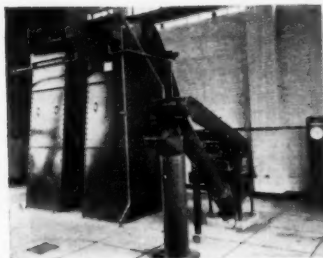
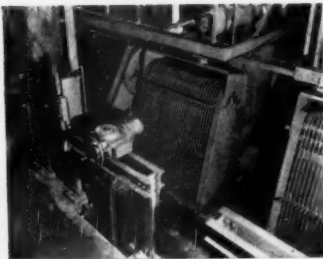
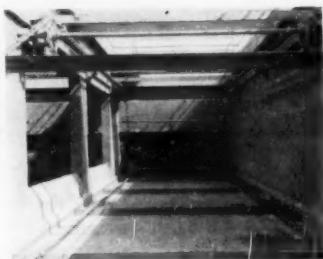
HRB INDEX

This is an index of the publications of the Highway Research Board. It covers 1,285 individual items. There is a subject index with all papers and reports listed alphabetically; and an alphabetical author index. 147 pages. Highway Research Board, 2101 Constitution Ave., Washington 25, D. C. No prices given; may be free.

The treatment of water and sewage by mechanical means has definitely proved most effective and economical — is the accepted practice in practically all modern plants. Jeffrey Sanitation Engineers are Specialists — treat each case in a practical way — are qualified by experience to offer technical information on equipment and plant design. Send for list of Jeffrey-equipped plants now giving day-in and day-out service.

a treat to get right treatment

*for
instance*



The five photos show the application of Jeffrey Screens, Collectors, Scum Removers and Grit Washers in both large and small plants. Also Sludge Elevators, Chemical Feeders, Screenings Grinders and equipment for biofiltration plants. Catalog No. 775-A goes into detail.

JEFFREY

ESTABLISHED
1877



SALES OFFICES IN PRINCIPAL CITIES

THE JEFFREY MANUFACTURING COMPANY 947 NORTH FOURTH STREET, COLUMBUS, OHIO

When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.

It's a Mower... with a Loader...



It's Your Cost-Cutting Combination!

Here's how to really step up the usefulness and profit-making ability of your Oliver Wheel Tractor-Loader. Simply add an Oliver Hydraulic Mower and you get a cost-cutting combination that will be busy virtually all year round. You can install the mower quickly and easily for those few days or weeks of work per mowing month... pull it off for the regular run of loading jobs. It's the ideal combination to cut your operating costs.

This powerful mower fits right into your tractor-loader. Cutter bar is driven by the hydraulic pump of the loader so no separate power units are required. Mower will cut anything from thick matted grass to moderate brush—in fact, almost anything that will pass between the knife guards. Hydraulic safety mechanism practically eliminates knife damage. Operator can cut right up to



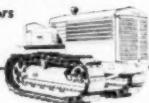
an obstruction... hydraulically raise the cutter bar to clear the obstruction...go right on mowing.

For all the facts on this cost-cutting combination that gives you year-round work with a tractor-loader-mower economically, see your Oliver Distributor or write us direct.

THE OLIVER CORPORATION

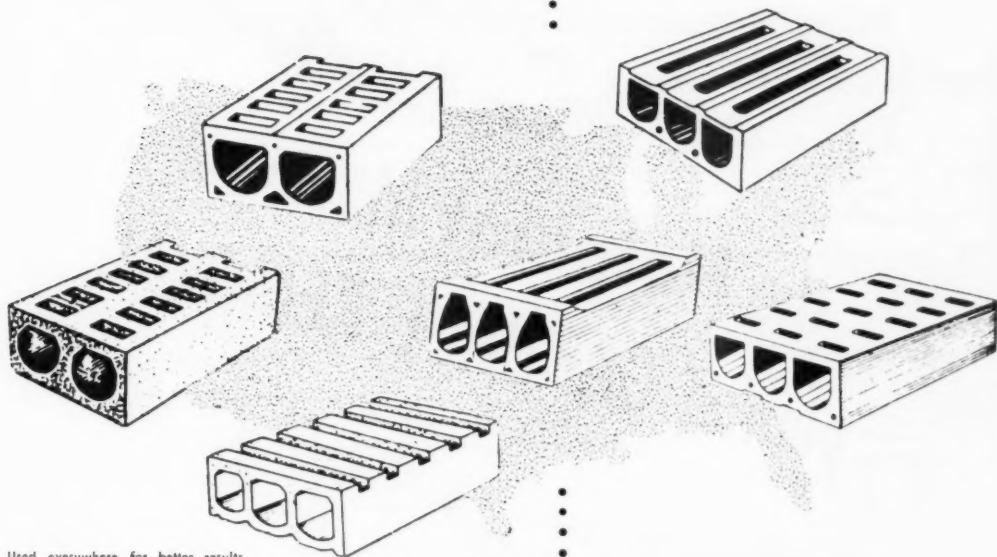
Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio

A complete line of Industrial Wheel and Crawler Tractors



TODAY'S FILTER PLANTS

• use vitrified clay
• filter bottom blocks
•



Used everywhere for better results from trickling filters.

PLACE: UNITED STATES OF AMERICA
ENGINEER: CONSULTING ENGINEERS EVERYWHERE
•

To obtain best results from trickling filters, engineers now know they must specify a good floor. You can't see the floor when the filter is in operation. But it means the difference between eventual trouble and excellent results. It pays to specify the best.

That's why in plant after plant today you find floors of *vitrified clay filter bottom blocks*—floors that give life-time, trouble-free service and the finest operating results. These blocks are scientifically designed to provide the right drainage

and ventilation. Solids won't cling to their smooth channels. Air circulates freely through large top openings while the sewage flows out.

Yes, they are easy to lay, too, and self-aligning. You can work on them after laying. They come with standard fittings for all types and shapes of filters. Specify *vitrified clay filter bottom blocks* on your next job and forget about floor trouble.

Get full information today from any of our members below.

SPECIAL FEATURES: WON'T CLOG • RESISTS ACIDS • PROVED BY USE • EASY TO LAY

TRICKLING FILTER FLOOR INSTITUTE

AYER-McCAREL-REAGAN CLAY CO. NATIONAL FIREPROOFING CORP. BOWERSTON SHALE CO. POMONA TERRA-COTTA CO. TEXAS VITRIFIED PIPE CO. W.S. DICKEY CLAY MFG. CO.
Brazil, Ind. Pittsburgh 12, Pa. Bowerston, Ohio Pomona, N. C. Mineral Wells, Tex. Kansas City 6, Mo.

When writing, we will appreciate your mentioning PUBLIC WORKS



When writing, we will appreciate your mentioning PUBLIC WORKS

A way for Progressive City Management to save money!

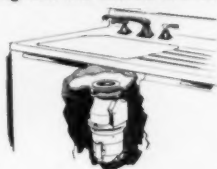
Garbage, as community officials all over the country know, is becoming an increasingly expensive municipal problem. The cost of garbage wagons, their maintenance and the workers to operate them, has been greatly intensified since the war. After shouldering this added expense, a community is still left with a malodorous, unsightly and dangerously unsanitary garbage collection system.

The Hotpoint Municipal Plan Provides the Remedy!

The Hotpoint Municipal Plan is the answer to this municipal garbage dilemma. A complete, factual presentation, based on experience and written specifically for municipal officials, is available for your study. It is the same presentation which has been made during the past few weeks at the request of many municipal governing bodies throughout the United States.

With a Hotpoint Disposall® in every home, your community will enjoy these advantages:

- A convenient, new and modern garbage removal system.
- Health protection to the members of all families.
- Fly and rat pest reduction.
- Waste collection cost reduction.
- More digestion gas for use and sale.
- Elimination of food waste before it becomes garbage.
- Elimination of alley garbage can.
- Elimination of garbage collection problems.
- Elimination of garbage odors.
- True sanitation for your town.



The Hotpoint Disposall is easy to install in any standard sink . . . convenient . . . safe . . . odorless and economical. Simple to operate . . . keeps kitchens, sinks and hands clean. Does not overload or clog sewer systems.

And—it saves you money!

Make your community "A City Without Garbage." Write today for a complete presentation of the Hotpoint Municipal Plan and banish forever the old-fashioned "can and wagon" garbage collection method.

Hotpoint will gladly make a comprehensive presentation of the Hotpoint Municipal Plan to the interested parties of your city government. Write, wire or phone Hotpoint Disposall Department, 5600 West Taylor Street, Chicago 44, Illinois.



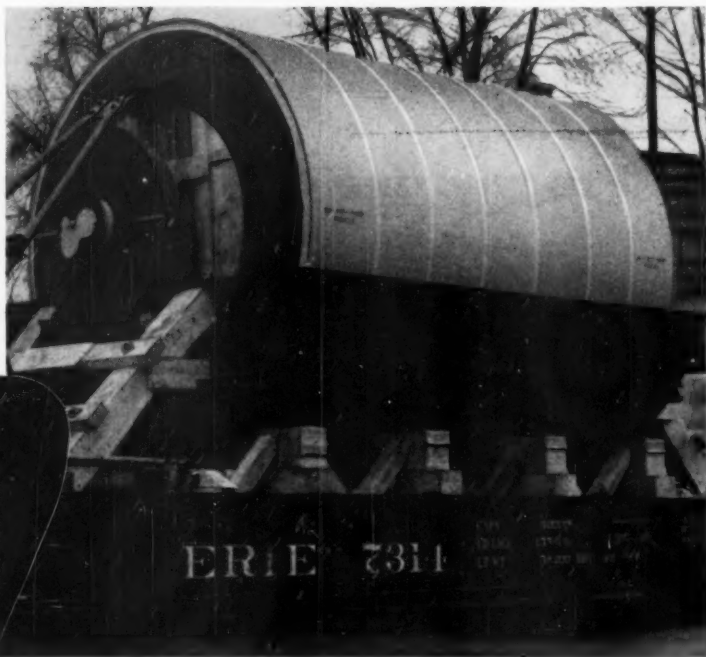
Hotpoint Inc.

(A General Electric Affiliate)

5600 West Taylor Street, Chicago 44, Illinois

**See
General
American
for
CREATIVE
FILTER
ENGINEERING**

*Designed
to do
your job
best!*



Sanitary District of Chicago selects Conkey Sludge Filters for world's largest sewage sludge dewatering installation

Next time you're in Chicago—visit the huge West-Southwest plant of the Sanitary District of Chicago. That's where you'll see the world's largest and finest sewage sludge dewatering installation.

Picture in your mind 66 Conkey Sludge Filters—a total of 38,000 sq. ft. of filter area in a single location. Each filter is 11 ft., 6 inches in diameter, with a face of 16 ft. And each filter offers many new and tested design features—improvements that mean more years of low-cost dewatering performance.

Typical of those features are plastic backing plates for filter cloth support, Uscolite pipe lines and drainage bells, a double scraper arrangement, specially formulated protective coatings and newly developed components made of special plastics.

The same high order of creative filter engineering that filled this million-dollar order for the Sanitary District of Chicago and many another customer, will "do it better" for you. An invitation: write for Bulletin No. 100 that more fully describes Conkey Sludge Filters.

Other General American Equipment:

Turbo-Mixers, Evaporators, Thickeners,
Filters, Dryers, Towers,
Tanks, Bins, Kilns, Pressure Vessels

OFFICES IN ALL PRINCIPAL CITIES



**Process Equipment Division
GENERAL AMERICAN
Transportation Corporation**

Sales Office: 10 East 49th St., New York 17, N. Y.
General Offices: 135 S. LaSalle St., Chicago 90, Ill.

NEW and Heavy-Duty Engineered

TO SAVE YOU MONEY



Whether you haul by the yard or by the ton

You get lower-cost performance, more miles of trouble-free hauling, and longer life from every new International Truck because every new International Truck is **HEAVY-DUTY ENGINEERED**.

Proof of this statement boils down to this:

1. Heavy-duty truck buyers keep records of hauling costs right down to the last penny. On the basis of what these records show, these cost-conscious men have bought more heavy-duty International Trucks than any other make for 18 straight years.
2. The extra values that for almost two decades have assured America's most exacting truck buyers performance at lower cost per mile are engineered into every new International Truck from the smallest to the largest.

Every new International Truck from 4,200 to 90,000 pounds gross vehicle weight offers heavy-duty engineered stamina and operating economy combined with new comfort and ease of handling.

You get new comfort and driving ease in the "roomiest cab on the road." Step into the Comfo-Vision Cab

and discover how much more "move-around room" there is in the "roomiest cab on the road." Note how easy it is to adjust the wide seat to just the right position.

Look out through the one-piece, scientifically curved Sweepsight windshield. Place your hands right where they feel natural for driving—and you'll find them gripped around the sturdy steering wheel. And just wait till you start going—you'll enjoy more positive control... thanks to new Super-steering.

You get more all-round truck value in every new International Truck. See the new valve-in-head truck engines, new rear axles, new features throughout—all proved under actual operating conditions. Get the facts about new Internationals—the world's most complete line of trucks.

See for yourself... see your International Truck Dealer or Branch, soon.

International Harvester Builds McCormick Farm Equipment and Farmall Tractors... Motor Trucks... Industrial Power... Refrigerators and Freezers

Tune in James Melton and "Harvest of Stars"—NBC, Sunday afternoons

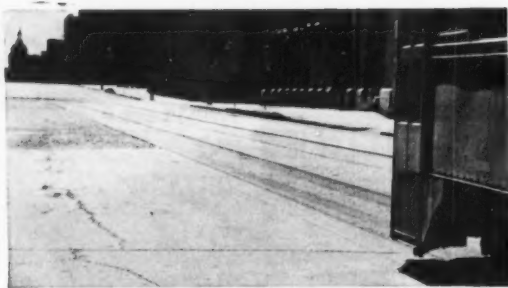


ALL NEW, ALL PROVED

INTERNATIONAL TRUCKS

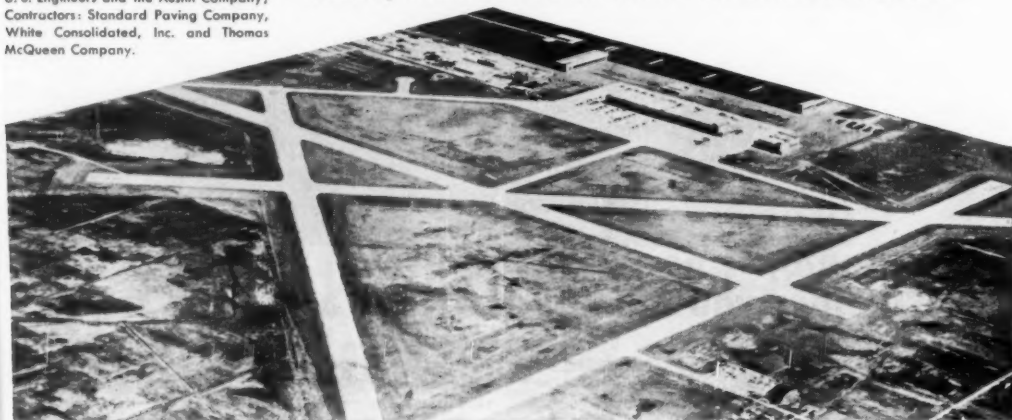
INTERNATIONAL HARVESTER COMPANY CHICAGO

When writing, we will appreciate your mentioning **PUBLIC WORKS**



For example: O'Hare Field (formerly Douglas Airport), Park Ridge, Ill. Duraplastic used exclusively. Placed 1942-43. Despite heavy traffic of war and peace ...and the rigors of seven tough winters... paving remains durable and highly scale-resistant. Designed and supervised by U. S. Engineers and the Austin Company; Contractors: Standard Paving Company, White Consolidated, Inc. and Thomas McQueen Company.

Today concrete paving of all kinds
prove **DURAPLASTIC*** makes
better, more durable concrete at no extra cost



Veteran airport or famous highway, country road or city street, simple sidewalk or service alley...millions of square yards of concrete paving of all kinds...have been proving, since 1939, that Atlas Duraplastic air-entraining cement makes better concrete, more durable concrete, at no extra cost.

Better concrete because Duraplastic requires less mixing water for a given slump; makes concrete more workable, more plastic, more uniform. The more plastic mix dumps, spreads, screeds and finishes easily; permits finishing closer to the paver; allows earlier protection for curing.

More durable concrete because Duraplastic minimizes segregation and bleeding; fortifies concrete against freezing and thawing; renders concrete highly resistant to the scaling action of de-icing salts.

Ten Years Ago...

In August, 1939, this concrete test paving was laid in Second Avenue North, Minneapolis. The badly scaled section of roadway in the background was made with regular portland cement. The foreground section, laid at the same time, was made with Atlas Duraplastic—the first commercial use of the air-entraining portland cement originated and developed by Universal Atlas.

Both sections, subjected to the severity of ten Minneapolis winters and to heavy applications of de-icing salts, are shown just as they appeared in July, 1949—convincing proof of the characteristic durability of Duraplastic concrete, of its high resistance to freezing-thawing weather and the scaling action of de-icing salts. Longitudinal structural crack shows some ravelling. Note perfect transverse joint.



At no extra cost because Duraplastic sells at the same price as regular cement; calls for no additional materials, no unusual changes in procedure. Duraplastic provides the proper amount of entrained air by *intergrinding* with the cement the precise amount of air-entraining agent needed for satisfactory field performance. It complies with ASTM and Federal Specifications. Send for **NEW FREE BOOKLET**, "A Decade of Atlas Duraplastic Air-Entraining Portland Cement." Write to Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, N. Y.

OFFICES: Albany, Birmingham, Boston, Chicago, Dayton, Kansas City, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Waco.

*"Duraplastic" is the registered trade mark of the air-entraining portland cement manufactured by Universal Atlas Cement Company.

PW-D-102

ATLAS DURAPLASTIC

AIR-ENTRAINING PORTLAND CEMENT

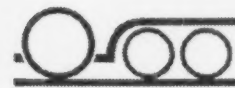
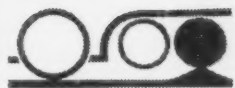
MAKES BETTER CONCRETE AT NO EXTRA COST

TRADE MARK REG.
U. S. P. O. CO.



"THE THEATRE GUILD ON THE AIR"—Sponsored by U. S. Steel Subsidiaries—Sunday Evenings—NBC Network

When writing, we will appreciate your mentioning PUBLIC WORKS



What is 3-AXLE SMOOTHNESS?

The answer to this question is a matter of record. By actual test, it is the highest degree of road surface smoothness ever attained with tandem roller. A leading state highway department proved that the Buffalo-Springfield 3-axle tandem produces surfaces 50% smoother than the average obtained with conventional tandems of equal capacity. Also noteworthy, the same test showed that the 3-axle tandem averaged 60% more tonnage compacted than other units on the project. As a result, the specifications for asphaltic surfaces in this state now permit the use of one less tandem roller with each spreader, *provided* a 3-axle tandem is one of the rollers employed.

Still another state specifically requires the use of a 3-axle tandem on certain plant mix surfaces.

There's a reason for this greater work capacity and smoother rolling results. The two large diameter guide rolls and the drive roll of the 3-axle tandem are rigidly mounted in a position tangent to the same plane. Thus, when one guide roll strikes a high spot in the pavement, the other is lifted clear of the surface and its weight transferred to the rolls retaining surface contact. Result—maximum compactive effort where it is needed most—on the high spots in the surface.

You can learn more about this transfer-of-weight principle and the many other exclusive features of the Buffalo-Springfield Model KX-25, 12 to 19 ton, 3-axle tandem from your nearest distributor. Why not call him today?



MAIL THIS COUPON TODAY
THE BUFFALO-SPRINGFIELD ROLLER CO.
Dept. G-6, Springfield, Ohio

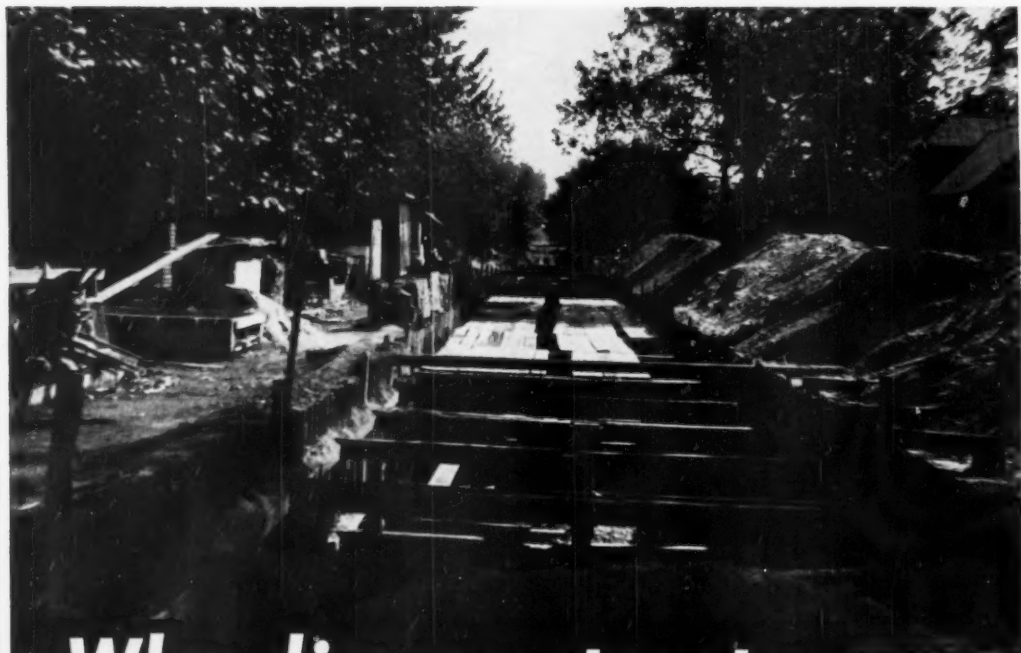
☐ Please send me Catalog 5-56-49 describing the right model for my requirements. ☐ Notify Distributor to call.

NAME

ADDRESS

CITY STATE

When writing, we will appreciate your mentioning PUBLIC WORKS



Why dig up streets

for underground structures?

You need not destroy expensive pavements and disrupt business to put in sewers and other underground structures. The simple, low-cost way is to tunnel the job with the aid of Armco Liner Plates. The work moves quickly. Business above ground goes on as usual.

Although amply strong, these lightweight corrugated metal plates are easy to handle. One man can carry, hold and bolt a section into place. No special equipment is needed.

But that's not all. With Armco Tunnel Liner Plates there is less excavation—less dirt to be handled and hauled away. And bad weather is never a problem.

Try tunneling that next job with Armco Liner Plates and see for yourself how they save you time, trouble and money. Diameters of Armco Tunnels range from 45¼ inches to 33 feet. Write for prices and other information. Armco Drainage & Metal Products, Inc., 4880 Curtis St., Middletown, Ohio. Subsidiary of Armco Steel Corporation.

EXPORT: THE ARMCO INTERNATIONAL CORPORATION



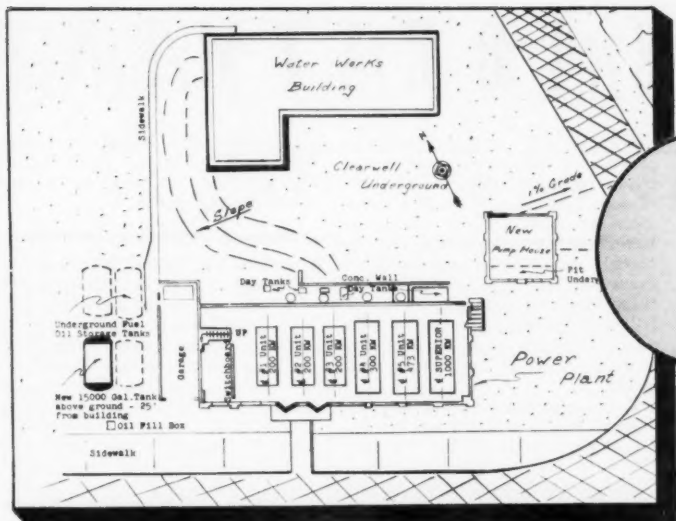
ARMCO TUNNEL LINER PLATES

When writing, we will appreciate your mentioning PUBLIC WORKS

JUNE 1950

PUBLIC WORKS MAGAZINE

VOLUME 81 • NO. 6



• SKETCH shows layout of power plant units at Newton Falls, Ohio.

NEW DIESEL ENGINE RAISES PLANT EFFICIENCY

OPERATING 24 hours a day since January, 1949, an 8-cylinder, 1440-hp Superior diesel engine and 1000-kw. Ideal generator have taken over the job of five smaller diesel generator units in the municipal power plant at Newton Falls, Ohio. By this conversion Newton Falls raised its plant efficiency from 11.8 kw. to 13.54 kw. per gallon of fuel used. The older engines now operate only during peak load periods and during down time for the new engine, thus permitting the new diesel to operate normally at 50% to 80% of its full load capacity.

Operating costs have been reduced enough to produce a substantial profit. Latest operating reports indicated net profits of almost \$35,000 for the first 10 months of 1949 in the face of fuel oil prices that have doubled since 1940 when the plant began generating power.

During the 10-month period the new diesel operated a total of 6,468 hours and produced 4,121,700 kwh. of energy. The total for 1949 is expected to be well over 5,000,000 kwh. During the previous nine years, the entire plant output from the smaller engines amounted to

25,110,000 kwh. The city was first supplied with electric power as a village in 1904 by a small privately owned plant, using steam. In 1940, the municipality took over the plant. In the municipal plant, diesel engines were used from the start. The first three units were each of 200-hp. In 1947, power requirements had increased to 4,206,700 kwh. and two more units were purchased to increase total capacity to 1373 kw. Rapidly climbing peak loads in the latter part of 1948 indicated that another power unit would soon be needed. Although the principal consideration in the decision to buy a sixth diesel capable of handling the whole power load was improved efficiency and lowered operating costs, there were other lesser factors to consider. The power house had room for only one more unit. Unless it were comparatively large, the next increase would mean enlargement of the power house or disposal of one or more smaller units. With turbo-supercharging the 1440-hp. Superior engine and generator occupy but little more floor space than the 200-hp. units.

Diesel fuel is stored in two underground tanks of 10,000 gallons ca-

capacity each, and a 15,000-gallon outdoor tank. A 20-gpm. pump transfers fuel oil to 1000-gallon day tanks located in concrete pits alongside the building. These tanks are filled twice daily. Fuel oil filters are checked every three weeks by the 3-man maintenance crew.

The lubricating system is of the dry sump type, equipped with a full-flow strainer and filter of the paper disk type. All filtering equipment, engine oil sump tank, lube oil cooler strainer, and motor driven lube oil pump are easily accessible in the basement. The lube oil pump is a positive displacement type that circulates oil through the filter at 500 gallons per hour. New oil, which is an SAE-30 grade, is stored in 55-gallon drums.

Latest inspections showed the original oil to be clean and free from impurities. Low consumption of lubricating oil has produced an approximate net saving of \$1,100 for 11 months of operation as compared with the operation of the older engines. The lubricating oil required from January to September of 1949 was 2606 gallons as compared with 6104 gallons during the preceding

(Continued on page 54)

SEWAGE TREATMENT



THERE were 5,786 sewage treatment plants, serving 5,480 communities, in the United States as of the end of 1945, according to the Public Health Service which maintains a continuing inventory of such plants. Of these plants, just about half, or 2,829 are of the primary treatment type; 2,799 are of the secondary treatment type; 98 provide intermediate treatment; and there are 60 others of miscellaneous, minor or unclassified types. The statistical report on this has just been completed.

Of the 2,829 primary treatment plants, 1,291, or nearly a half, are septic tanks; and there are 1,073 Imhoff tanks. Only 356 of the primary treatment plants included mechanically cleaned sedimentation tanks. In addition, there were 76 plants where hopper-bottom tanks were used and 33 others in which no tank details were given.

The types of secondary and intermediate treatment are of interest. Of the 2,897 secondary and intermediate treatment plants, the breakdown is: Activated sludge 324; chemical treatment 197; trickling filters 1,581, of which 1,459 are low rate and 122 are high rate; sand filters 448; contact beds 67; Dunbar filters 59; and contact aeration 17. In addition, application to land was reported in 422 cases, oxidizing ponds in 45 and magnetite filters in 19. There were 30 plants in which the treatment method was unclassified. Later in this article, the various types will be divided into population groups served; here the overall numbers will be given.

A surprisingly large number of the treatment plants are in the smaller communities. In fact, 8.4% of the total number of plants reported served communities of less than 500 population, and 18.3% of the plants reported are in communities of 500 to 1,000 population. The greatest number of plants, as well as the highest percentage, serve the population group of 1,000 to 5,000. These represent 48.8% of the total number of plants. Thus, about

75.5% of all sewage treatment plants are located in, and serve, places having populations of 5,000 or less. Naturally, there are many more of these smaller places—in fact about 20,000 of these are reported, as having a population in excess of 100, incorporated, unincorporated and "separate entities." It is no doubt in these smaller places that the great bulk of the septic and Imhoff tanks are to be found.

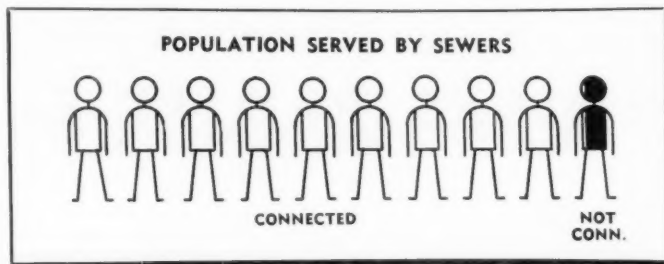
The communities having populations in excess of 5,000 number 2,261, of which 2,042 are incorporated. This is according to the 1940 census. The plants in this population group amount to 24.5% of the total, or about 1,420 plants. Thus, treatment has been provided in about two-thirds of this group of communities.

the 50,000 to 100,000 population group, 64.7% of the plants utilize mechanically cleaned tanks and 29.5% Imhoff tanks.

Data on Secondary Treatment

It does not appear that any consideration has been given, in the discussion of plants providing secondary treatment, to the type of settling tanks used; only the methods of secondary treatment are listed. It is probably safe to assume that most of the plants listed below utilize mechanically cleaned tanks, though there are probably a good many Imhoff tanks also.

Over 25 million people are served by the 2,897 intermediate and secondary treatment plants. Of these plants, 201 serve communities of



● **MORE than 8,900 communities were served by sewer systems in 1945, with 91.9 percent of the population connected to the system.**

Data on Primary Treatment

Though Imhoff and septic tanks together comprise about 83.5% of the total number of primary treatment plants, these types serve but 36.0% of the population. The 356 plants using mechanically cleaned tanks serve 55.7% of the population connected to primary treatment plants. The trend is clearly shown by the fact that in the population group under 500, septic tanks comprise 62.4% of all plants, Imhoff tanks 32.6%, and mechanically cleaned tanks only 2.5% of the plants. In the next population group—500 to 1,000—45.3% of the plants use septic tanks, 45.9% use Imhoff tanks, and 5.1% use mechanically cleaned tanks. In the 1,000-5,000 population group the proportions are: Imhoff tanks 39.0%, septic tanks 47.4% and mechanically cleaned tanks 9.8%. However, in

less than 500 population, including 6 activated sludge, 71 standard rate filter, 3 high rate filter, 63 sand filter and 55 land application. In the 500 to 1,000 population group, there are 487 plants, including 31 activated sludge, 242 low rate trickling filter, 13 high rate trickling filter and 112 sand filter. The 1,000 to 5,000 population group has 1,381 secondary treatment plants, of which 69 are chemical treatment, 127 are activated sludge, 735 are low rate filter, 63 are high rate filter and 199 are sand filter.

The 415 plants serving the communities in the 5,000 to 10,000 population range include 39 chemical, 47 activated sludge, 215 low rate filter, 26 high rate filter and 47 sand filter. In the 10,000 to 25,000 group are 240 plants—38 chemical, 50 activated sludge, 128 low rate filter, 12 high rate filter and 25 sand filter, a total of 253 plants. In this case,

PLANTS AND METHODS

IN THE UNITED STATES

and usually throughout this article, numbers are not additive, since a plant may be listed under two or more types if two or more of the unit processes are used in the plant.

In the 173 plants serving communities of more than 25,000 population, there are 63 activated sludge plants, 68 low rate filter and 5 high rate filter.

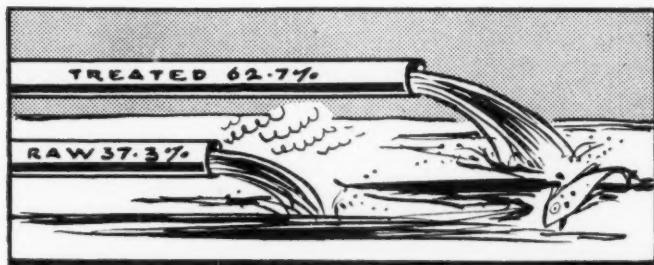
Activated sludge treatment, used in 324 of the plants, serves 11.5 million persons; trickling filters, used in 1,581 plants, serves about 9.5 million persons.

treatment plants serving 34.2% of the persons contributing to treatment plants. In general, the use of chlorination increases as the size of the community increases. Only 15.1% of the plants in the smallest population group have chlorinating facilities, whereas 37.7% of the plants of the largest population group use chlorine.

Grit removal is practiced at 765 plants serving almost 28 million persons. Though only 13.2% of the plants are equipped with grit removal mechanisms, the plants so

equipped serve about 60% of the population connected to treatment plants. The use of grit chambers in small plants is limited—there are 52 installations in plants serving less than 1,000 people. There are 267 installations in the plants serving the 1,000 to 5,000 population group; and 148 in the 5,000-10,000 group.

Grease removal, as an integral part of the treatment process, is practiced at only 67 plants. However, these are practically all large plants, and the process serves a population of about 8 million.



● OF the group connected to sewers, 37.3 percent discharged raw sewage and 62.7 percent was served by treatment plants of some sort.

Source of Data

These data, which are based on the 1945 Public Health Service inventory of water and sewage facilities, were summarized by John R. Thoman, sanitary engineer, who is stationed at the Environmental Health Center at Cincinnati. The data are available as a 30-page reprint, much of which is in tabular form. Copies of this reprint, or information on where and how to get it, will be furnished by the Editor of PUBLIC WORKS on request.

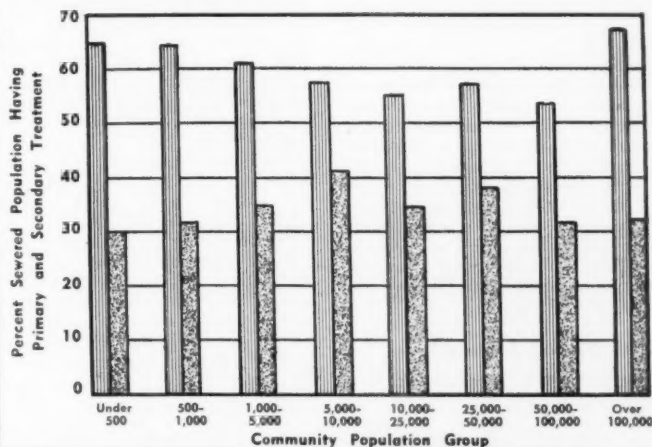
Sludge Processing and Disposal

Separate sludge digestion tanks are used at 1,372 plants and multi-stage digestion at 108 plants. Imhoff tanks are used for digestion at 2,409 plants and septic tanks at 1,695. The disposal of undigested sludge is reported at 32 plants.

Drying beds are used at 3,764 plants, lagoons at 100 plants and mechanical dewatering devices, probably nearly all vacuum filters, at 102 plants. Over 1,700 plants report no sludge disposal facilities. Most of these are probably small septic and Imhoff tank installations where sludge is drawn infrequently. Elutriation of sludge is reported at 10 plants.

Other Methods of Treatment

There are 1,262 plants at which the sewage is chlorinated, this method being used at 21.8% of the



● PERCENT of sewered population having primary treatment is shown by bars at left; that with additional secondary treatment at right.



OIL

STORAGE TANKS ARE ELECTRICALLY HEATED

WILLIAM A. STANCER

Engineer, Pierce Co., Wash.

HOLDING asphalt and road oil in storage tanks at temperatures suitable for use has long presented a bothersome problem when conventional steam coils have been used for heating. Our studies and investigations of this problem have indicated that a very substantial saving could be accomplished by using electricity rather than steam for heating the tanks.

Because of the unusual topography of Pierce Co., it was deemed advisable to provide storage facilities in three different locations in the county. Oil is secured from the contract supplier at a point about 60 miles distant from our storage facilities and is hauled in truck tankers of about 5,500 gallons capacity to our plants.

A Typical Storage Plant

A typical plant consists of a 12,000-gallon storage tank, electrically heated; a loading tank of 3,000 gallons capacity, electrically heated; and the necessary control and handling facilities. Some of these plant units are shown in the accompanying illustrations.

The oil is received at our storage sites at a temperature of 175° to 200°. During the period when oil is being used continuously the temperature is kept at 200° in the storage tanks. This temperature is raised in the loading tank as may be required for application to the roadway surface. Longer hauls from the storage point to the road site may cause a variation in the required temperature at the delivery point and this temperature change is taken care of by the heaters in the loading tank.

Tanks are insulated with rock-wool and jacketed with aluminum. An ordinary swing spout located slightly above the heating unit provides the means for loading the distributor tank. Electric heaters lend themselves to simple automatic temperature control which requires little attention and a supply of heated material at uniform temperatures is available at all times. Boiler maintenance costs and steam line repairs are eliminated. The heating is accomplished through large tubular resistance heaters having diameters of the order of 3½" and available in lengths up to 30'. Such heaters lend themselves well to typical storage tank configurations

and the installation is relatively simple.

Inside of the heater tube there is mounted a specially designed set of heater coils, supported in ceramic blocks, and so arranged that the entire assembly of coils and supporting blocks may be easily withdrawn. Because of the basic nature of the heater design, such heaters are automatically considered to fall in the vapor-proof classification and are substantially explosion-proof. By special arrangements they may be made entirely explosion-proof in the full sense of the term. Our heaters were engineered and manufactured by Ted Kinney of Western Factors, Seattle.

Electrical Heating Details

Electrically the design of the heaters is such that each heater comprises a balanced three-phase star connected load and the heaters may be designed for operation on either 230 or 460 volts although 230 volts is generally to be preferred. It is important to note that no transformers are required with this class of heater—also that no portion of the heater which carries the electrical potential used in heating is directly exposed to the asphaltic materials. The electrical design is such that the heater coils operate at black heat. Since the heater coils operate at such relatively low temperatures, and are totally enclosed in a heavy steel tube, a life of many years can properly be expected. Also, due to the nature of heater design, it is obvious that the heater coils may be so engineered as to deliver to the tubular heater sheath any desired wattage density.

In summation the heaters described are of extremely heavy rugged construction. They lend themselves physically to the job to be done. They are conservative as to electrical design. They are flexible as to wattage density specifications. They are extremely simple to install or inspect and should maintenance ever be required they can be repaired from materials readily at hand.

Simple Automatic Control

Automatic temperature controls generally comprise a simple thermostat, which preferably both indicates and controls the storage temperatures, and a solenoid type enclosed contactor of suitable type used in conjunction with a standard "hand-off-automatic" switch. These con-

energy required to increase the temperature of the asphaltic materials from the "as received" to "as delivered from storage" is not a particularly large item in most cases. The power company usually makes a charge on the electrical demand which, for the average job, is a fairly constant portion of the total KW rating of the electrical heaters. Consideration of these factors suggests two points:

1) Since the material is received hot and requires only a moderate temperature rise within the storage tanks, fairly wide variations in amount of materials handled through the system do not result in heavy changes in the power bill. A considerable portion of a typical bill is based on the other two factors involved.



● **STORAGE facilities consist of two 7000-gallon main storage tanks which feed by gravity to a 2000-gallon loading tank. All three tanks are electrically heated and hold oil at 200° temperature.**

trol items are available as standard equipment from a number of suppliers and present no problems when properly selected either as to suitability or reliability.

The Cost of Electricity

In contemplating the cost of operation of a typical plant it should be understood that the total monthly electrical bill is based on three factors: 1) Electrical energy used to make up radiation losses through the tank insulation; 2) Electrical energy used to raise the temperature of the asphaltic material from "as received" to "as delivered from storage." 3) Electrical demand charge.

Contrary to what might seem to be the case the amounts of electrical

2) Calculations of total electrical input should be based on the first two factors rather than on the total heat required to bring the entire storage to delivery temperature from a cold start.

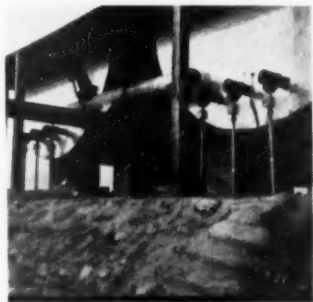
In the light of the foregoing regarding cost of operation, the tabulation below, taken from the records of the power company, is interesting. The figures shown are for operation during the 1949 summer months of a 16,000-gallon MC2 storage facility split between three individual tanks—two main storage tanks, each 7,000 gallons, cross-connected, and feeding into a 2,000-gallon load conditioning tank. The total rating of the heaters was 45 KW at 230-volt, three-phase, whereas the power company demand charge was based on an average demand of 34 KW:

May	\$68.97
June	90.57
July	83.37
August	84.81
September	79.05

Based on the regular power company heating rate, the average monthly bill for operating this 16,000-gallon storage plant was slightly over \$80.00 per month for the five months from May through September. Further, the equipment was not shown favors of any kind and was used regularly and steadily in the usual manner of a typical county road district operation. A check of another similar 20,000-gallon storage, where a tally was kept on total gallons of asphaltic materials put through the plant, indicated a power cost of 2½¢ per hundred gallons processed.

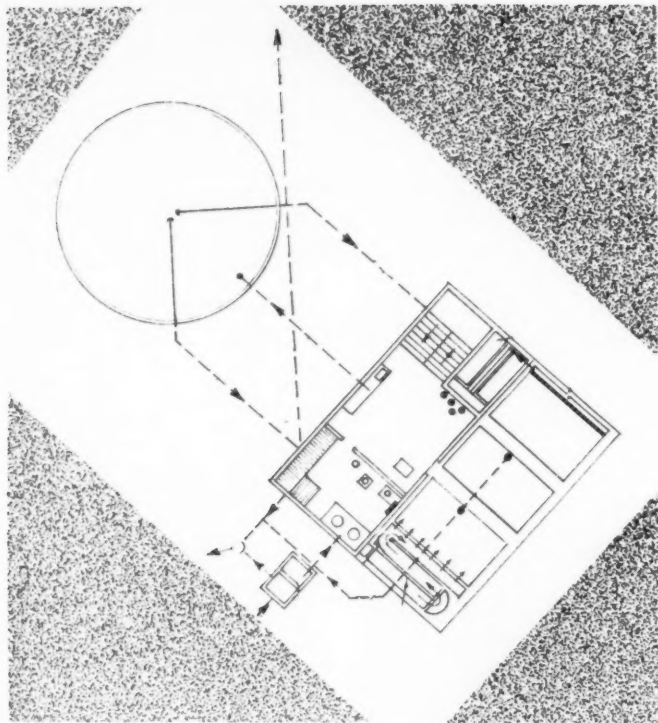
The arrangement, which has been found quite satisfactory for electrically heated storage facilities in the range of 15,000 to 25,000 gallons capacity, is to have one or more main storage tanks cross-connected to a smaller "loading" tank. The main storage tanks are carried at perhaps 25° F. below the ultimate required delivery temperature, the final temperature being attained in the so-called loading tank. This makes for low radiation losses in the main storage tanks and is off-set by having slightly greater heater capacity in relation to volume in the loading tank. If a natural hillside is available it is desirable to arrange the main storage tanks above the loading tank in such a manner that gravity flow takes place.

The plant, as described, has been more than satisfactory. It has been economical to operate and has provided a most convenient source of supply.



● **CLOSE-UP SHOWS ends of tubular heating elements.**

SMALL Filtering

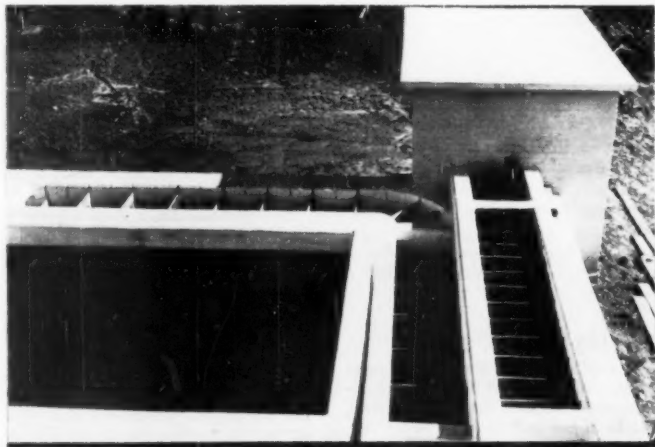


- **SURFACE water is treated with baffle mixing, settling and filtration at Cumming, Ga. Circular clearwell provides water storage.**

N. M. deJARNETTE,
Public Health Engineer
Georgia Department of Public Health

IN many water works circles the thought prevails that small water purification plants with capacities of less than approximately 0.5 million gallons per day are impractical, inefficient and uneconomical; however, such is not necessarily the case. The same basic principles of chemistry, physics and other sciences apply to the small as well as to the large plant. It is merely a matter of adapting these principles to small scale practices.

The fact is readily conceded that both the initial and operational cost of a filtration plant will usually exceed that of a ground water supply (receiving no treatment other than chlorination) where ground water is available; yet even in communities of around 500 population these small filtration plant systems amortize their initial costs and pay their way although water rates are held to reasonably low levels.



- **"OVER and under" type of baffle mixing basin is frequently used in small water plants. This view shows the plant at Hartwell, Ga.**

These small plants are practical if for no other reason than that they afford public water supplies to many small communities which otherwise would be without a public system. This is illustrated by

the fact that the geological formations beneath considerable areas of North Georgia are extremely poor aquifers. Large springs or wells with yields sufficient for a municipal or industrial supply are rare, consequently all of the larger and many of the smaller towns have been compelled to develop water supplies from surface streams. At one time five Georgia communities of 300 to 500 population were operating complete water purification plants, each with rated capacity of 50 gallons per minute, and at the present there are more than thirty such plants in operation with capacities of less than 0.5 million gallons per day.

Small Plants Are Practical

One basic difference does exist between the large city plant and that serving the small village. This is the matter of operation. The city plant is under the management of a superintendent, frequently a grad-

uate engineer, who directs an operational crew of trained technicians and skilled mechanics. Obviously few communities in the one or two thousand population class can afford an operational staff of this

PLANT EXPERIENCES

Surface Water in Georgia

caliber, desirable though such may be. Consequently the smaller plants are frequently operated by persons without a great amount of formal technical training. Yet the smaller the plant the more versatile the operator must become for, in addition to handling production, he may be required to look after distribution, meter reading, customer complaints and perhaps a number of other matters. To design a water plant which these small communities can afford and which can be depended upon to produce a satisfactory water at all times is a challenge to both engineer and equipment manufacturer alike. Both have made progress although interrupted at times when some town found itself the guinea pig in proving some previously untried or inadequately tested feature of design, equipment or process only to have this prove unsatisfactory.

Factors in Design

The writer is of the firm opinion that it is a mistake to make these small purification plants highly automatic. In the first place, such essential details as regulating the amounts of coagulants with varying raw water conditions cannot yet be handled automatically; secondly, more technical knowledge and skill may be required to keep some of the automatic features operating properly than is readily available in many of the smaller towns; and last, so called automatic equipment encourages the idea, especially with

many false-economy-minded city fathers, that it is unnecessary for an operator to be on duty when the purification units are in service. On the other hand, certain automatic features may be practical in even the smallest plants.

Emphasis must be placed upon designing these small plants with as many factors of safety as are economically possible. If money is scarce, and it usually is, provision should be made for safety, efficiency and convenience of operation first and ornamentation second, never overlooking, however, the importance of keeping a plant neat and clean. It is a food processing plant meriting the same careful attention as a dairy, bakery or a restaurant kitchen.

Experience indicates the desirability of giving special consideration to some of the units in these small plants as discussed in the following paragraphs. Current practice at plants in Georgia is shown in the table on the following page.

Raw Water Supply

Raw water storage is not generally practiced by the small plants, the trend being to pump water direct from stream to mixing basin. One reason for this is that the cost of an impounding or raw water storage reservoir may be more than the town can afford. On a flashy stream which may become highly turbid at times a raw water reservoir offers such advantages as permitting natural sedimentation, equalizing raw water quality, provision of reserve supply for dry weather flows; simplification of intake problems; and, where topography permits, elimination of raw water pumps. Disadvantages include relatively high construction costs; algae growths necessitating taste and odor control; excessive siltation on some streams; and occasionally hostile relationships with the communities' swimmers or fishermen. Good fish propagation depends upon abundant algae growths which are incompatible with good water supplies.

Another disadvantage in some areas is an increase in iron and manganese content of the water

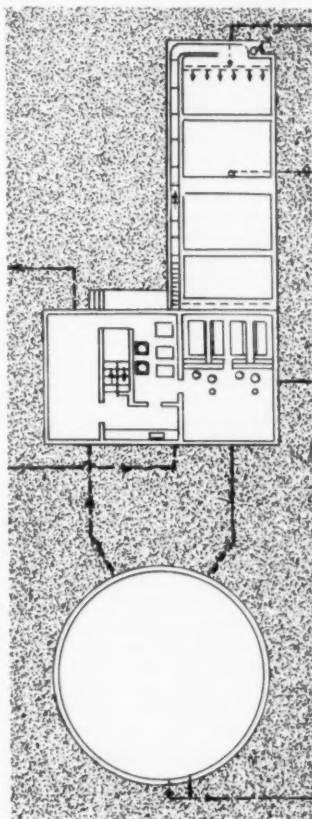
which may occur months or years after the reservoir is constructed. Apparently these elements are dissolved from the clays and other formations in the bottom of the reservoir under the anaerobic and acid conditions in the bottom waters formed by the decomposition of the organic matter in the settled silt.

To store or not to store should be decided by local conditions in each case.

One pressing need for the plant taking water from a small sand, silt and/or leaf laden stream is a simple, inexpensive intake which will keep



● **LABORATORIES** are essential for good plant control.



● **LAYOUT** of the 300 GPM water plant at Douglasville, Ga.

sand out of the pumps and will not become clogged with trash or leaves especially on cold, rainy nights with the stream at flood stage!

Chemical Feed Equipment

With good equipment and careful and skilled attention small amounts of alum and soda ash may be applied more accurately as solutions than is possible by dry feed machines while lime and activated carbon are difficult to apply as solutions.

In recent years several manufacturers have developed dry feed machines which are proving quite satisfactory for even the smallest plants. Some machines, however, are impossible of regulation at the low



● **COMPACT plant treats 150 G.P.M. at Buchanan, Ga.**

rates required. Dry feed machines offer the advantages that their discharge may be quickly and accurately checked; they require less space, less time and attention to recharge and regulate and are usually less messy than solution feeders.

If care is exercised in securing dry feeders accurate within the low ranges required for these small plants they are to be preferred to solution feeders for applying such chemicals as lime, alum, soda ash and activated carbon.

The desirability of prechlorination is becoming more and more evident for such plants and if this is practiced, liquid chlorine may be used in even the smallest plants as the amounts of chlorine applied will come within the range of chlorinating machines available today.

When rates are less than 100 gallons per minute the use of hypochlorites may be more satisfactory than liquid chlorine on final effluents.

Mixing Basins

Until recent years the importance of proper mixing in the coagulation process was frequently overlooked. The term "mixing basin" is a misnomer as it accomplishes con-

siderably more than merely mixing the chemicals with the water. Both time and energy as well as correct dosage are necessary for efficient floc formation.

If as much as two or three feet of head may be lost through the basin a properly designed "over and under" baffle type mixing basin gives excellent results at these small plants. A minimum of 30 and preferably 45 to 60 minutes retention in the mixing basin is usually desirable. High velocities in the inlet end gradually reducing toward the discharge end are customary.

Local experiences with mechanical mixing devices on these plants have been most unsatisfactory. Few have equalled and most have fallen far short of the results obtained from a good gravity mixer. Many of these mechanical installations have been discarded outright either because of poor results obtained or because of mechanical failure and high maintenance cost. In a gravity mixer about the only maintenance cost is the occasional replacement of the top wooden baffles which are not submerged at all times.

Current Practice at 31 Georgia Water Treatment Plants of Less Than 0.5 M.G.D. Capacity

Raw Water —	
Storage Basins	9
Direct from Stream	22*
Gravity to Plant	5
Pumped to Plant	26
Chemical Feed —	
Dry Feeders	27
Solution Feeders	4
Mixing Basin —	
Gravity Baffle	24
Mechanical	7
Filter Medium —	
Sand	29
Anthracite	2
Filter Wash —	
Wash Water Pump	23
Wash Water Tank	2
From City System	6
Disinfection —	
Prechlorination	14*
Postchlorination	17
Liquid Chlorine	27
Hypochlorites	4
Emergency Pumping Equipment 10	

* Several plants practice both pre and post chlorination.

Settling Basins

The first factor of safety here is time. Six hours theoretical retention should be a minimum for these small plants. Rectangular basins with length to width ratio of 2.5 or 3 to 1, or even more, appear to give better effluents than square or circular, radial flow basins.

Short circuiting due to temperature changes reduces retention time far below the theoretical. To overcome this a so-called "stilling wall" or other device which will provide reasonably uniform distribution of the incoming water both vertically and horizontally deserves careful engineering attention.

Still another safety factor, the importance of which has been frequently overlooked, is the location of the settling basin overflow. Structural expediency usually determines this; however, if it is placed at the outlet end of the mixing basin, an operator, by closing down the filters, may permit uncoagulated water to overflow to waste whenever the floc is "lost". This condition occurs at times especially following sudden heavy rains or upon starting up a plant after some material change in raw water characteristics has occurred since it was previously closed down. Ofttimes 30 minutes or more are required to reestablish good flocculation. In the meantime with this arrangement poorly coagulated water may be wasted rather than passed to the settling basin where its effects persist for many hours and results in shortened filter runs or poor quality plant effluent.

Multiple skimming weirs at the discharge end of the settling basin furnish applied water on the filters far superior in quality to that obtained over submerged weirs or other less efficient means of taking water from settling basins.

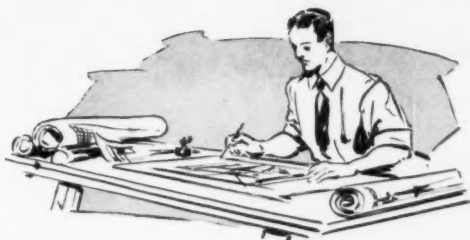
Filters

If a thorough job has been done up to this point, little work should be left for the filters; but because poorly flocced and settled water does occasionally reach the filters they must still be regarded as a major factor of safety. For the same reason the trend toward rates considerably in excess of 2 gallons per square foot per minute reduces this factor which is a mistake in the case of these small plants.

The writer prefers sand to anthracite as filtering material in these units, admittedly without too much justification other than that any ad-

(Continued on page 50)

ALUMINUM ALLOYS IN SEWAGE TREATMENT



RICHARD C. KASSER,

Head, Structural Section Development Division
Aluminum Company of America

ATTRACTION appearance of sewage treatment plant facilities with a minimum of maintenance is the goal of most plant designers. Many design engineers are constantly striving through the use of corrosion resistant materials to make this desire a reality. During the past twenty years, light weight aluminum alloys have contributed substantially to the achievement of this goal.

Resistance to Corrosion

Aluminum alloys have high resistance to corrosion caused by the substances usually found in sewage. Hydrogen sulfide, for example, often present during various stages of the sewage treatment process, has little effect on aluminum even at high temperatures. Mixtures of hydrogen sulfide and gaseous ammonia do not attack aluminum, and aqueous ammonia attacks the metal only superficially with the formation of a protective coating which effectively prevents further action.

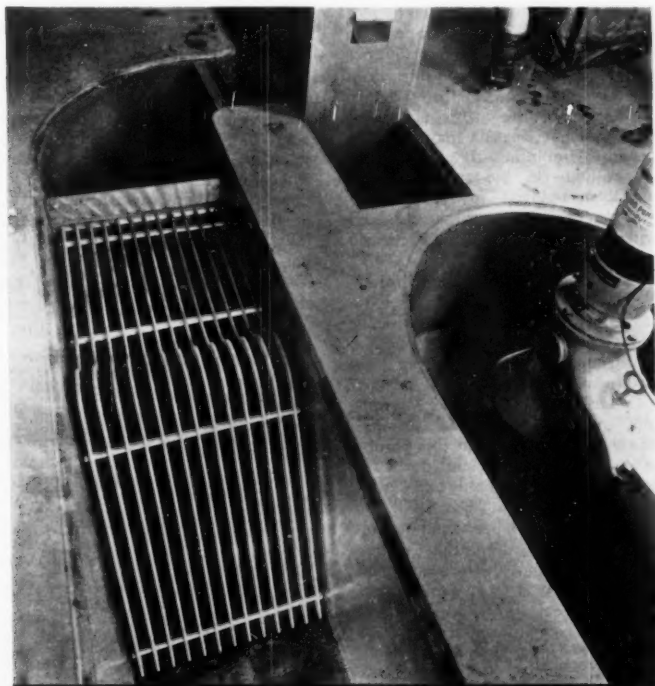
Organic acids as a class are not seriously corrosive to aluminum, although formic acid and organic acids containing chlorine are exceptions. Methane, the predominant gas in the mixture commonly called sludge or digester gas, is harmless to aluminum.

Strictly domestic sewages, although they may vary in strength from one community to another, generally contain substances of very similar character. In 1931, test specimens of several aluminum alloys were exposed at various stages in disposal plants throughout the country. At the end of a two-year exposure period, the specimens were so little affected by the domestic sewage that it was believed that aluminum could be successfully employed for submerged applications in domestic sewage plants. Numerous installations made since that time have shown that this is the case.

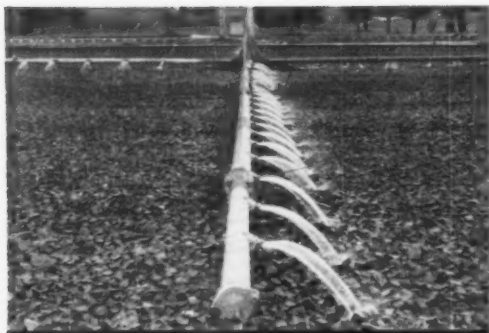
Tests have also been made on aluminum alloys in plants where combined domestic and industrial sewage are prevalent. While the experience gained by exposure of aluminum in these cases has given generally favorable results, no all-inclusive recommendations can be made. Any selection of metals must depend upon an evaluation of local conditions.

Operating Applications

The earliest known application of aluminum alloys for sewage treatment operations in this country dates back to 1921, when under the direction of William M. Piatt, Consulting Engineer of Durham, N. C., aluminum sheets were used as liners for cast iron diffuser plate holders at a plant in Gastonia, N. C. The success of this application led to further study and eventually resulted in the development of a cast aluminum diffuser plate holder.



● APPLICATIONS of aluminum are shown in this view which includes aluminum slide gates, bar screen grating and curb angle.



● **DISTRIBUTOR** arms made of aluminum pipe.



● **GREASE** skimmers are another application.

During the period from 1930 to 1942, about 30 known installations of this cast aluminum product were made.

For the most part, cast aluminum diffuser plate holders have given excellent, low maintenance service. The few cases in which galvanic action was encountered illustrate the importance of avoiding dissimilar metal connections or guarding against them by means of insulation. Following this first application of aluminum in sewage treatment the metal has been used very successfully in many other items of equipment. Aluminum alloys that have given outstanding service for up to fifteen years with no signs of failures are now being employed in more than one hundred sewage treatment plants. Many of these applications are particularly important from the standpoint of appearance and maintenance.

Slide gates and guides are among the most widely used aluminum alloy applications for sewage treatment plant equipment. The light weight of the metal, about one-third that of steel, permits manual operation of many gates where mechanical equipment would otherwise be required. The excellent resistance to corrosion of aluminum alloys has also made them the choice of many engineers for both manually and mechanically operated gates. Gates are usually fabricated from flat plate stiffened where necessary with structural shapes.

Weirs and scum and grease collection systems made from aluminum have established enviable records. Like many aluminum applications, these light metal units have reduced maintenance problems by eliminating shutdown time for painting.

The items mentioned so far are usually fabricated to the engineer's design by so-called "Job Shops."

There is no reason, however, why a standard line of such aluminum alloy equipment cannot be established, and some manufacturers are doing this. In recent years, fabricators throughout the country have acquired a background in the handling of aluminum alloys. Today, the progressive metal working shops are equipped and experienced to a point where building with aluminum alloys has become routine.

Screens and Distributors

Installations of bar screens fabricated from aluminum have also given satisfactory performances. In addition to its resistance to corrosion, the aluminum alloy used for this application has the strength necessary for the rough treatment to which bar screens may be subjected. Aluminum alloy bar stock is available in the standard sizes usually employed for screens, so that the screens can be obtained with the same facility as those made of other metals.

Aluminum alloys applied to rotary distributors for trickling filters have proved their worth in reducing maintenance and improving plant appearance. One outstanding example is the unit installed in 1935 at Cedar Rapids, Iowa, where aluminum pipe was used for the distributor arms. Although this equipment has never been shut down for maintenance painting, it still is in excellent condition. Smaller distributor units have been made which included cast aluminum center columns. Aluminum alloys are ideal for rotary distributors, regardless of size.

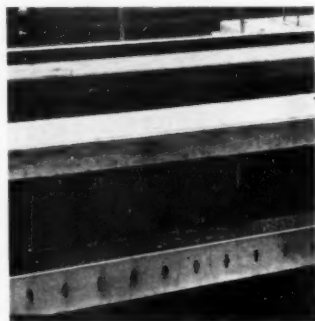
The use of aluminum alloys is particularly advantageous for such purposes as motor and equipment housings which frequently require constant maintenance programs. If

aluminum is used, the housing surface keeps its pleasing, metallic appearance without painting. For the same reason, tread plates, sidewalk doors and manhole steps, also available in aluminum alloys, improve the appearance of any plant.

Architectural Applications

Aluminum architectural items are well established in the construction field, and their value is even more pronounced in the corrosive atmosphere about a sewage treatment plant. Aluminum has served in this capacity for many years with very little maintenance.

Most aluminum architectural items can be obtained as easily as those of other materials. For example, many of America's foremost window manufacturers stock and supply aluminum windows in a wide variety of types and sizes. These windows have a decorative appearance and their trouble-free operation makes them economical. Many manufacturers feature combination windows of aluminum, including interchangeable storm and screen sash. Many windows are



● **WEIR** plates are made of corrosion-resistant aluminum.

manufactured from extruded aluminum shapes, although some are made by the die cast method or from formed sheet sections.

Aluminum doors and door hardware are produced by a number of manufacturers. These doors available in standard sizes, in either flush or panel styles, or they may be fabricated to specification from hollow extruded shapes and sheet. Such doors are lightweight, fire resistant, sound deadening and impervious to dampness. Standard hardware items include butts, locks, door handles, push bars, push plates and kick plates.

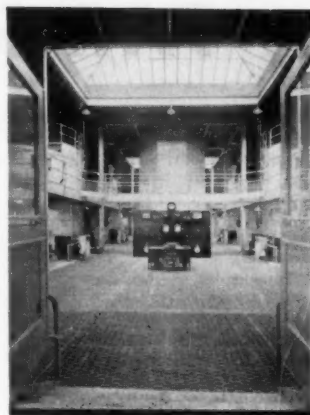
Handrail pipe is also readily available in aluminum. Standard pipe sizes in 1½ inches, 2 inches and larger can be obtained in 12 and 20-foot lengths from aluminum pipe distributors. Handrail pipe fittings are available in both the flush and threaded types. If an ornamental railing is desired, it can easily be obtained through a contractor. Necessary ornamental handrail accessories are also available and many standard shapes are stored by aluminum distributors.

Aluminum is finding extensive use as ventilating and air-conditioning grilles, sidewalk gratings, utility stair tread and platform gratings. Most manufacturers of floor grating are now producing in aluminum and safe-load tables can be obtained from them. Aluminum gratings such as these need no protective coating of paint, have high strength and are non-sparking.

Other architectural items which add to the appearance of a sewage treatment plant are stairs, ladders, thresholds, louvers, skylights, roofing gravel stops, flashings, coping, spandrels and ventilating ducts. The Easterly Sewage Treatment Plant at Cleveland, Ohio, completed in 1938, is an excellent example of the beauty and durability of architectural items as applied to the buildings of a treatment plant.

There are important electrical applications of aluminum which can also be used to advantage in sewage treatment plants. Some of these are lighting fixtures, fittings, wiring devices, conduit, and insulated wire and cable, all of which are in common use in industry.

Aluminum is available in standard forms and there are no unusual problems in using it. The metal can be obtained in the form of plate and sheet, structural shapes, wire, rod, bar, tubing of all types, forgings, castings of all kinds, rivets,



● INTERIOR view of incinerator building shows aluminum gratings, treads and skylight.

nails, screw machine products and special items. Drilling, punching, threading, sawing, milling, planing and other machining operations can be performed on aluminum in accordance with commonly accepted practices. In addition, aluminum alloys can be joined by all the usual methods, including welding and riveting, in such a way as to present a neat and finished appearance.

Relative Cost

Some aluminum applications may cost a little more than those made from the more common ferrous materials, but since aluminum will not require frequent paintings, there is a constantly accumulating saving in maintenance expense which soon offsets the higher original cost. Alu-

(Continued on page 62)

TABLE 1—ALUMINUM APPLICATIONS IN WIDE USE IN SEWAGE TREATMENT PLANTS

Application	Product	Recommended Alloy*
Slide Gates and Guides	Sheet or Plate Rolled Shapes Extruded Shapes	Alclad 3S-H14 or Alclad 4S-H34 61S-T6 63S-T5
Weirs	Sheet or Plate	Alclad 3S-H14 or Alclad 4S-H34
Scum and Grease Collectors	Sheet or Plate Pipe	Alclad 3S-H14 or Alclad 4S-H34 63S-T6
Bar Screens	Bar	61S-T6
Rotary Distributors	Tubing Cast Fittings	63S-T6 214
Motor & Equipment Housings	Sheet or Plate Rolled Shapes Extruded Shapes	Alclad 3S-H14 or Alclad 4S-H34 61S-T6 63S-T5
Manhole Steps	Forging	61S-T6
Floor Gratings	Bar	61S-T6
Tread Plates	Plate	61S-T6
Ventilating Ducts	Sheet	3S-H14

*Rivets when required should be of alloy 53S-T61.

**Nuts & Bolts when required should be of alloy 24S-T4 with #205 alumilite finish.

TABLE 2—TYPICAL *MECHANICAL PROPERTIES OF RECOMMENDED ALUMINUM ALLOYS

Alloy & Temper	Tensile Strength Lb. Sq. In.	Yield Strength Lb. Sq. In.	Elongation Percent in 2 In. Sheet 1-16" Thick Round Spec. 1/2" Diameter	Brinell Hardness	Shearing Strength Lb./Sq. In.
214	25,000	12,000	—	9	20,000
3S-H14	21,500	19,000	8	16	14,000
A1 3S-H14	21,500	19,000	8	16	14,000
A1 4S-H34	34,000	27,000	9	12	18,000
53S-T61	—	—	—	—	23,000**
61S-T6	45,000	40,000	12	17	30,000
63S-T5	30,000	25,000	12	—	18,000
63S-T6	35,000	30,000	12	—	22,000

**Shear strength of driven rivet.

*These are not guaranteed minimum properties.

How to lay TAR SURFACE

GEO. E. MARTIN,

Consulting Engineer,
Paving Materials Section,
The Barrett Division
Allied Chemical & Dye Corp.

PRACTICALLY every highway department, large or small, wherever located, carries on a large mileage of bituminous surface treatment work each year. It is a simple operation and yet one that can cause a lot of trouble if not done exactly right.

Most surface treatment work is placed over bituminous, brick or concrete surfaces although a considerable amount of new gravel and macadam is treated each year. After the prime coat has been applied to the new gravel or macadam, the conditions are about the same as those of a bituminous surface.

The object of the treatment is to waterproof the existing surface, and provide a new traffic resisting top. Many factors will influence the efficiency of the surface treatment to accomplish these results.

Preparing the Surface; Materials

Holes should be patched, preferably some time prior to the surface treatment to permit the patches to be consolidated under traffic. The surface to be treated should be clean and dry. At one time this was a

major operation but now, with almost 100% automobile traffic, cleaning is not much of a problem, except along the edges. The lighter tars will penetrate through dirt and dust on the road surface while the heavier grades will not. Therefore, more care in cleaning is necessary if a heavy tar is used.

All grades of tar from RT-2 to RT-12 have been used successfully for surface treatment work. The lighter grades are generally specified for the poorer surfaces and the heavier ones for the better surfaces. Climatic conditions will also influence the choice, the heavier materials being used in warm Southern climates and the lighter grades in the colder climate in the North. The heavier grades will set up quicker on the road, and are thus less objectionable to traffic.

The amount of tar to be used on any specific job will depend upon the condition of the existing surface and the grade of tar to be used. An open surface will require more tar than a tight, closed one to obtain equal results.

The amounts actually used vary from $\frac{1}{8}$ to $\frac{1}{2}$ gallon per square yard. Even a half-gallon does not make a thick layer when spread uniformly over a square yard. If none of the tar is absorbed by the road surface the layer is only 0.089 inch thick. This thin layer must waterproof the existing pavement and hold the cov-

ering aggregate tight enough to resist displacement by traffic.

Aggregate Information

The covering aggregate may be sand, gravel, stone or slag. Sand is used only on light tar—generally not heavier than RT-4—or on very light applications (about $\frac{1}{8}$ gallon per square yard) of the heavier grades.

The maximum size of the covering aggregate depends upon both the grade of tar and the amount of tar used. The aggregate size should vary directly with the quantity and viscosity of the tar. The more and the heavier the tar used, the larger the size of aggregate which can be held on the road surface. Top sizes will run up to $\frac{3}{4}$ -inch although this size is rarely used.

The amount of aggregate needed for covering will depend upon the amount of tar available for holding the cover. In theory the quantity of tar should be sufficient to immerse the lower two thirds of the depth of the covering aggregate. If more tar is used the road may bleed. On the other hand if less is used the aggregate may be displaced by traffic. The commonly used rule of ten pounds of stone for each one-tenth gallon of tar is not far wrong, but must be modified to fit the individual job.

For the smaller aggregate sizes a practically one-sized material ap-



● TAR application of $\frac{1}{8}$ to $\frac{1}{2}$ gal. per sq. yd. bonds aggregate and waterproofs surface.



● SURFACE is covered with sand, gravel, stone or slag. Quantity depends on amount of tar.

TREATMENTS

pears to be satisfactory. For the larger sizes there should be sufficient fines partially to fill the voids. Too much fine material, however, may form a coating on the tar and prevent the larger particles from adhering to the road. From 10% to 30% passing the No. 4 sieve is generally adequate.

Weather Conditions

The ideal condition would be to have the road surface dry and the covering aggregate damp, but not wet. Investigation has shown that tar will not stick to a pavement when the pavement is wet. However, if the treatment can be protected from the action of traffic until it dries, the tar will adhere to the pavement and the treatment will be successful. On the other hand a shower, even immediately after the tar has been applied to a dry road, will usually do no damage. In very hot weather the tar should be kept at as low a temperature as possible in the distributor and still spray satisfactorily. In fact this is a good rule for all surface treatment applications.

Details of Procedure

On practically all jobs the aggregate is spread by machinery. This results in a more uniform and more accurate distribution of the covering material than when the work is done by hand.

If one of the lighter tars and a sand cover are used, the surface may be dragged with a sled drag. This will remove minor irregularities and produce a satisfactory surface. This is not true where a heavy tar and a larger sized aggregate are used. In this case the drag will tear the surface and satisfactory results will not be obtained. A broom drag may be used to distribute the covering material evenly.

There seems to be little necessity for rolling the lighter tars having a sand cover. Traffic will compact them adequately while the tar is curing. If the work is properly done there is no reason why this should be objectionable to traffic if the cars are not driven too fast while the tar is setting. For heavier tars and larger aggregate better results will be obtained by sweeping, and rolling the aggregate into the tar. The rolling should follow closely the application of the covering aggregate.

All authorities agree that better results would be obtained if the road could be closed to traffic for twenty-four hours to permit the tar to set. However, the best we can do, in most cases, is to permit driving over the surface as soon as the aggregate is applied and try to have the speed of traffic reduced.

In some cases the covering aggregate has been previously coated with about 2% by weight of a light tar. This cuts the dust on the sur-

face of the aggregate particles and gives better adhesion. However, it is an extra operation and some question exists as to its worth.

Once in a while a job done with heavy tar in the late fall will bleed during the following spring. Sometimes also a job will bleed during the same season. The usual corrective method is to apply additional cover. This will not be successful if the same sized cover is used as was used on the original treatment. The covering aggregate must be smaller. One of two things may have happened. Either too much tar was used in the original treatment and it has buried the aggregate; or, for some reason, the aggregate has been removed from the treatment. In either case only a very thin layer of tar remains on the surface even though it may look like a lot. Clean sand or similar sized aggregate should be used to blot up the excess tar. Most jobs of this sort turn out to be excellent surface treatments. Another corrective measure is to apply an additional surface treatment over the bleeding road. It looks foolish but it works.

Surface treatments will probably be with us for a long time. After all they are the cheapest, and often the best way to maintain many pavement surfaces. Proper selection of materials and correct application procedure will produce good looking and long lasting results.



● BROOM drag attached to roller may be used to distribute the covering material evenly.



● FINISHED tar surface treatment provides a good looking traffic resisting highway top.



Courtesy Metcalf & Eddy

- **CHLORINATOR building for Cleveland Brook water supply.**

THE design and operation of small water supplies constitute a problem on which specific literature is scant. Following the publication some time ago in this magazine of a series of articles on "Small Sewage Treatment Plants," requests were received for similar data on small water works. Information has been obtained from State Sanitary Engineers and from manufacturers of equipment suitable for small plant installations. This is the first of a series of articles which will be

information in the preliminary report, this will include: (a) Present and future population; (b) daily demand for water; (c) allowance for water losses; (d) if a surface supply (1) chemical analysis of the water; (2) water shed area, population and description; (3) estimated runoff and pollutional sources; (e) if a ground water supply (1) number, depth and character of proposed and adjacent installed wells (or springs); (2) definite information on subsurface

FACTORS in PLANNING



Courtesy Stanley Engr. Co.

- **FILTER plant recently completed at Clear Lake, La.**

published from time to time during the next several months. The excellent article in the February issue of PUBLIC WORKS by W. W. Towne, and others of a similar nature which will appear later, should be considered a part of this series.

State Board of Health Requirements

Few state departments of health have specific regulations governing the basic designs of small water supply and purification plants, though nearly all of them require the submission of detailed plans and of rather complete engineering reports. Such specific requirements regarding treatment as have been made available to us will be given in the appropriate sections of later articles.

Texas recommends the submission of a preliminary report "in order for the design data to be discussed prior to the preparation of the detailed plans." This procedure is probably acceptable to and desired by all state health departments. Items to be covered in the preliminary report include: (a) Statement of the problem; (b) present and future areas to be served, with population data; (c) source of supply and character and quantity of the water; (d) proposed site of plant; (e) type of treatment, equipment to be used, and capacity; and (f) basic design data, as detention periods in settling basins, filter loadings, ground water hydraulics, fire protection, etc.

A complete engineering report must be submitted with the final plans, giving the data on which the design is based. In addition to the

strata; (3) analyses of the water or, in the absence of this, analyses of neighboring and similar supplies; and (4) information on flooding of the site, casing protection and sealing methods.

Treatment methods to be covered in detail include: (a) method of treatment and description of units; (b) full data on pumps, if used; (c) rate of operation of each unit of the plant; (d) provision for laboratory control; (e) method of disposal of wash water or sludge; (f) description of special devices; (g) special methods of maintenance or operation; (h) reserve or standby units; and (i) factors in the general location of the plant. A general map on a scale of 100 to 300 ft. to the inch should be prepared.

California has very complete requirements covering early contact, discussion, report, plans and investigation by the staff of the State Sanitary Engineer.

Volume of Water For Fire Protection

In most cases, a water supply is as much a source of fire protection for the small community as it is a convenience or a protection to health. The savings in insurance premiums is often a considerable factor in constructing a water supply. In most cases, therefore, the requirements of the National Board of Fire Underwriters will markedly influence design.

In general, the following requirements for fire flow will govern: For a community of 1,000 population, provision must be made for a flow of 1,000 gallons per minute for 5 hours; for 1,500 population, the flow must be at the rate of 1,250



Courtesy Chicago Bridge & Iron Co.

- **WATER storage smooths pumping and gives fire protection for small communities**

gpm for a duration of 5 hours; for 2,000 population, the flow provided must be at the rate of 1,500 gpm for a period of 6 hours; for 3,000 population, 1,750 gpm for 7 hours; for 4,000 population, 2,000 gpm for 8 hours; and for 5,000 population, 2,250 gpm for 9 hours. These requirements, which may be met by storage or by pipe line capacity, apply during a period of 5 days of maximum domestic consumption.

The basis for these are "in part, upon the assumption that the maxi-

per 100 ft. for a flow of 250 gpm, and 12 pounds for 500 gpm, which is the capacity of two fire lines. For the same reason, it is undesirable to use 4-inch pipe for hydrant branches. Excellent fire protection is furnished in small communities by 6-inch pipe, either looped or in a gridiron system. However, when dead-end lines exceed 800 ft. in length, it is better to use 8-inch pipe.

Sections where there are small buildings occupying not more than

based on the estimated population 20 years or more in the future.

Standards adopted by the California section of the AWWA covering capacities of water systems call for "combined capacities from all sources . . . at periods of maximum demand of a rate of flow . . . for 2 hours" based on a formula which considers the number of "customer units." If a customer unit is 4 people, a population of 1,000 would require about 480 gpm; a population of 2,000 about 650 gpm;

SMALL WATER WORKS

mum daily consumption is 50% in excess of the average." Where canals, streams, ponds, wells and cisterns make a suction supply available to pumping engines, "this suction supply may be considered in its ability to offset" deficiencies in certain items "but not in excess of the pumper capacity available."

Effective fire streams require that pressures be maintained at the hydrant at the time of fire flow at about 60 pounds, though where buildings are low and scattered, this may be reduced to 50 pounds. Where fire engines are used, these can obtain an adequate supply of water if the hydrant pressure, during flow is only 20 psi. The best method is often to carry a pressure of 40 to 60 psi in the mains and depend on pumpers or fire protection.

Reliable fire protection requires such duplication of parts as to insure the required fire flow when such parts of the system as may reasonably be expected to become inoperative are out of use. The provision of storage offsets to a greater or less degree, depending on its amount and location, the need for such duplication.

The use of polluted supplies to augment capacity during fires is highly undesirable and should be considered only when no other source exists. It must be cleared with the State Department of Health, full provision being made for satisfactory emergency treatment.

Distribution Systems

The use of 4-inch mains for fire protection is undesirable. Friction loss in such pipe is about 3 pounds

a third of the block frontage require two fire streams, or about 500 gpm. For effectiveness, hose lines should not exceed about 400 ft. in length; therefore, hydrants should normally be no more than 400 ft. apart in such areas; and closer in more densely built up areas. It is good practice to place one hydrant at each street intersection, and locate intermediate hydrants midway in the block, if the block is more than 350 to 400 ft. long.

Capacity Requirements

A survey some years ago, covering a large number of cities, showed that consumption of water varied from 40 to 528 gallons per capita per day; and in cities of less than 10,000 population, averaged 115 gpcd. There can be no set rules for estimating consumption. Local conditions are of maximum importance. The consumption of neighboring similar communities should be checked. Weight should be given to the need for irrigation; to possible industrial and commercial use; to air-conditioning possibilities; to metering of all services; and to pressure, quality of construction work and other factors. Generally at least 150 gpcd should be provided,

and a population of 3,000 about 850 gpm. This formula gives high results for small communities.

A common defect in the design of small water systems is that inadequate provision is made for future enlargement or improvement. A source of supply may be selected which is definitely limited as to quantity; or a supply line laid which, within a few years is unable to supply the needed water and has to be replaced or reinforced, or a treatment plant is built which is difficult or impossible to add to later. Most small communities will always remain small; but water use does increase; and, to a reasonable degree, this increase should be provided for; or, at least, enlargement should be made as easy as possible. Also, softening or filtration may at some future time become desirable or necessary, and in the layout of the distribution system, consideration should be given to this, if it appears at all possible. Likewise, storage may be needed in the future. The distribution system layout should, and usually can, be planned so as to avoid the necessity of laying, at some later date, a large pipe through paved streets in order to reach the storage site.

Factors in Planning Small Water Works

According to the census of 1940, there were 3,464 incorporated "urban" areas of more than 2,500 population; and, in addition, there were 3,205 incorporated "rural" areas with populations ranging from 1,000 to 2,500. There were only 2,042 cities of more than 5,000 population. If, as reported, there are approximately 12,000 water works of all sizes and types in this country, the great bulk of them are very small installations. In fact, approximately 83% of these 12,000 installations would have a probable daily water consumption of less than 0.5 mgd; and 60% of them would have a probable daily consumption of less than 0.1 mgd. In Texas, according to V. M. Ehlers, Director of the Bureau of Sanitary Engineering, there are "approximately 600 public water systems having capacities of 0.5 mgd or less. Systems of this capacity (0.5 mgd or less) comprise approximately two-thirds of all Texas public water supply systems."



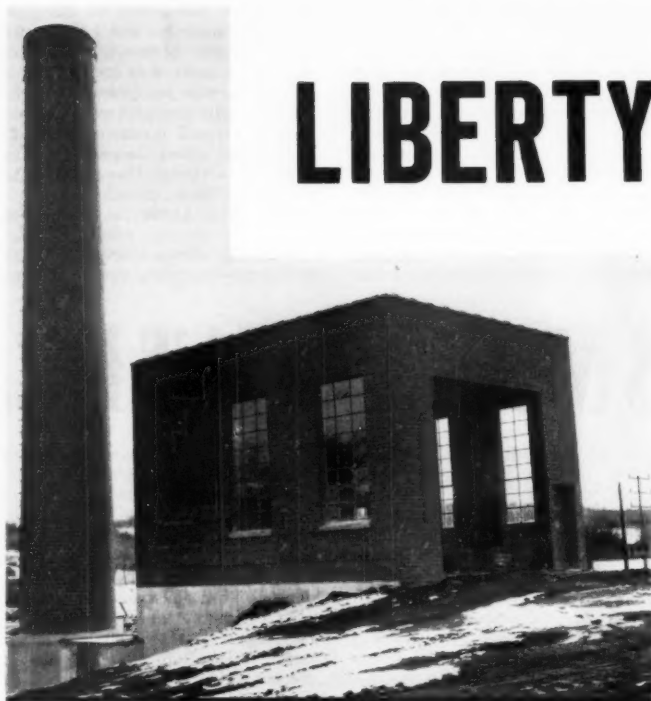
LONG in need of refuse disposal facilities, Liberty, New York, established a project for an incinerator as its contribution to the wartime "blueprint now" program. Preliminary sketches and estimates of costs were made and a bond issue of \$88,000 was voted. Tentative plans called for a 2-unit 60-ton plant. It was found, when the war ended, that the amount of money available was not sufficient to build the proposed plant.

The population of the village is about 6,000 for 10 months of the year, swelling to 11,000 in the two summer months. On this basis, a 60-ton plant could scarcely be justified, but it was the opinion of the consultant then handling the work that sufficient refuse would be brought in from hotels and boarding houses in the surrounding rural area to require a plant of this size; and that the charge of \$2 per ton for destroying this refuse would, to some extent, cover the operating costs of the plant.

Planning the New Plant

In 1948, W. A. Hardenbergh, who had grown up in Liberty, was requested by the Mayor and Village Board to work with the Superintendent of Public Works, John Lawrence, and the local engineer, Olney Borden, to develop a plant that could be built within the funds available to the village and that would meet its future needs. Further study was made of local conditions, and probable growth factors. From these studies it appeared that relatively little further population growth was likely within the next few years; that considerable accretions of refuse from outside the corporate limits were improbable; and that it would be more economical to operate a smaller plant 10, 12, or even 16 hours a day than to construct a larger plant. This was especially the case in view of the small winter collections and the difficulty in operating properly a large plant on the 5 or 6 tons expected to be collected daily during 10 months of the year.

The Village approved the recommendations of the engineers as fol-



● **VIEW of the incinerator, showing entrance to charging floor. Site permitted easy access to both charging and stoking levels.**

lows: To construct a 30-ton furnace in a building of suitable size, so designed as to permit construction alongside of it at a later date, if desired, of a similar building and furnace; and to construct a chimney large enough to handle two 30-ton furnaces, this to be offset slightly from the existing building so as to serve readily the future unit if and when built. A new location was selected which avoided costly access road and ramp construction, eliminated a rather steep approach to the plant, and provided convenient disposal of ashes on the existing village dump. This location also permitted easy connection to existing water lines and sewers.

Competition Assured

It was the desire of the village to have the fullest competition by established manufacturers of incinerators. Consequently, the specifications were drawn to permit both rectangular and round furnaces, or furnaces with mechanical stoking arrangements. A furnace burning capacity of 2,500 pounds per hour was required, based on refuse con-

taining 65% of garbage and 35% of refuse by weight, the mixture having a moisture content of not over 50% by weight and containing not more than 15% by weight of non-combustible material. Combustion chamber volume, auxiliary oil burner, grate area, firebrick lining and stoking clearances were specified, as well as other essential items in connection with the furnace. The chimney, to be 70 ft. high, of brick, and lined with firebrick, was required to have a top opening of not less than 15 sq. ft. based on the pos-

DATA ON THE LIBERTY INCINERATOR

Summer Population	11,000
Winter Population	6,000
Furnace Size 24 hrs.	30 tons
Probable Refuse Characteristics:	
Garbage	65% by weight
Refuse	35% by weight
Moisture	50% by weight
Non-Combustibles	15% by weight
Chimney Height	70 ft.
Chimney Design Basis	60 tons
Bid Price	\$65,500

Builds an Incinerator

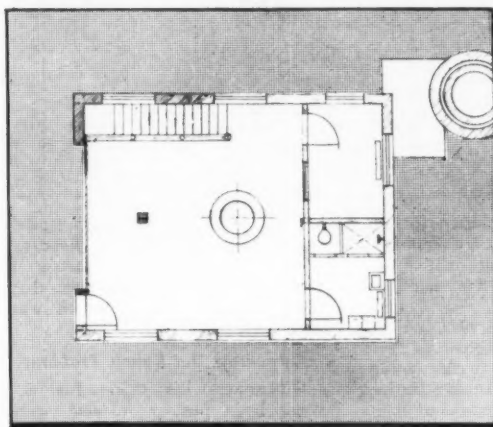
sibility of another furnace being added in the future.

The building was required to have a floor area of roughly 750 sq. ft.; and its details of construction and equipment were fixed by specifications. The charging floor is 13 ft. above the stoking floor; the stoking floor has an overhead clearance of 16 ft.; an office is provided and a toilet room, which includes a shower stall provided with hot and cold water. Heating is provided for the entire building by an oil burner; all doors are metal, with those providing truck entrance of the rolling

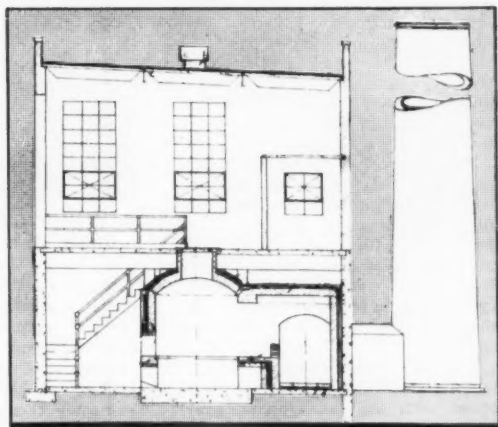
Incinerator Co. was accepted, in part due to the excellent floor plan provided. This company was second low bidder at \$65,500. The contract was awarded early in 1949, and construction began as soon as weather conditions permitted. The incinerator was completed in November, 1949; an acceptance test was run on December 13, under the direction of T. W. Cadmus of Nash, Cadmus & Voelker; and the plant was accepted. The test was run under difficult conditions of snow and rain; and in order to obtain sufficient refuse for the test, it was necessary to call on

chasing needed equipment for collection. Two trucks were purchased. One was equipped with a Heil refuse collection body and will be used for residential and market garbage collection; the other with a dump body will be used for rubbish collection. A third truck may be purchased later. Some of the remaining funds will be spent for minor additions and improvements to the plant. Because of the desire to insure bids within the \$83,500 available, only necessities were included in the specifications.

John Lawrence, Superintendent of



● **PLAN of the charging floor shows how the chimney is offset to serve future unit.**



● **SECTION of incinerator building through charging chute, furnace and flue.**

steel type and electrically operated. The building is brick-faced, with windows of steel sash. An electric hoist is provided for handling the charging hole cover.

Excellent Bids Received

Bids were received from all four recognized manufacturers of municipal incinerators. Those bids ranged from \$62,400 to about \$75,000 for the complete job; all of them complied fully with the specifications and any one of them would have proved an excellent purchase for the Village. The bid of the Nye Odorless

the neighboring village of Monticello, 12 miles distant, which sent four large Load Packer Truck loads.

Because of the amount of moisture in the refuse, the oil burner was started at 10:05 just after the start of the test, but was discontinued at 10:50 and not again used. The furnace showed its ability to surpass the requirements of the specifications, operating during the test at the rate of nearly 3,000 pounds per hour.

Since the cost of the incinerator was but \$65,500 and \$83,500 was at hand, funds were available for pur-

Public Works, is in charge of collection and disposal, the cost for which is paid from tax funds, no collection charge being made for either refuse or ashes. Frank Jewell was Mayor at the time of the award of the contract, later being succeeded by Richard Yaun. Other members of the Village Board were S. S. Sprague, Clifford Poley, Russell Hill and Richard Hartman.

The officials and citizens of Liberty are much pleased with their incinerator, which has performed excellently during the 6 months it has been in service.

CONTROLLING SEWER INSECTS AND SEWER ODORS

LEON GARY
Mayor of Houma, La.

DRAINAGE is an ever-present problem in Houma. This city, located in South Central Louisiana, lies in flat, marshy country; it is only 10 feet above the Gulf of Mexico, which is 50 miles away. The sewage collection system suffers from flat grades and depends on sewer lift stations. These discharge the sewage to a main gravity sewer which, in turn, discharges to a main pumping station which forces the sewage through two miles of main to the treatment plant.

The sewer system and the treatment plant date back to 1930. A new plant is now under construction; meanwhile treatment is by Imhoff tank, filters and sludge drying beds. Like many other cities, Houma has outgrown its original system, for its population has more than doubled in the past two decades.

The flat sewer grades and the ensuing deposits in the sewers, combined with the hot climate, presented a most pressing odor problem. Not only was odor a problem at the treatment plant, but citizens in many parts of the city complained vociferously. We had no immediate answer to the problem and we gave little thought to the insects that we noticed in sewer manholes.

Odor Control Experiments

Our No. 1 problem was odors and what could be done about them. We tried calcium hypochlorite solution which we applied at the various lift stations. Results were not satisfactory, though we continued to experiment and eventually applied it so liberally that the cost appeared prohibitive, even if it had been effective. We decided then to try



● **TEEMING** roach population can be seen on the walls of this manhole. Cloroben treatment successfully exterminated the insects.

Cloroben, about which we had some hopeful reports.

In the summer of 1947, we obtained sufficient Cloroben to apply a dosage of 2 ppm to the sewage reaching the plant. Dosing stations were established at manholes at the heads of six laterals, selected to cover the principal sewage flow. The equipment for application consisted of two 30-gallon drums welded together to form a tank of 60 gallons capacity. A petcock was inserted near the bottom and this was opened just enough to give a steady drip into the sewer at a rate so that the 60 gallons were applied over a 24-hour period. A screen was placed behind the petcock to prevent clogging. These tanks were filled each morning by a member of the sewer maintenance crew. After adding the prescribed amount of Cloroben, he filled the tank with water.

During the first few days we applied a shock dose of about 10 ppm

of Cloroben based on our total flow. Within 24 hours of our first application, pleasantly successful results appeared. The sewage arrived at the plant odor-free and non-septic. Within a short time improvements were noted in the plant and in the effluent discharge canal.

The first day that Cloroben was applied we noticed that the influent to the plant carried a mass of dead cockroaches. Workmen reported that when they put the dosing stations into operation, cockroaches were quickly driven out of cracks and crevices in the manholes. Most of them died before reaching the street or within a few feet of the manhole

opening. It did seem, however, that direct contact with Cloroben was necessary.

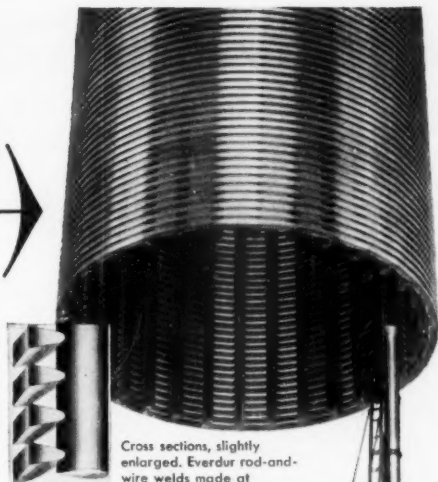
Attacking the Roach Problem

Our sewage lift stations had always been heavily infested with roaches and we decided to apply a direct spray to the wet well walls. We used a 1% solution and found the infestation to be beyond description. Our men were almost driven out; so instead of merely spraying the wet well walls, we sprayed the entire structure. The 1% solution did a thorough exterminating job. As a result, we decided to go still further and thereafter we disinfected sewers that were located near restaurants and schools. Now we have declared war on cockroaches and we find that the answer to roaches in sewers is neither difficult nor costly.

We make a solution of 1% Cloroben and fill a couple of 50-gallon (Continued on page 52)

EVERDUR for well screens

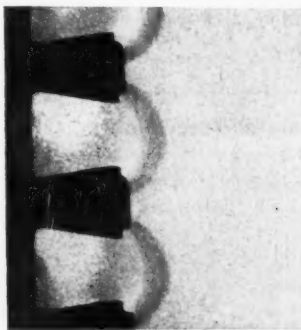
Famous for exceptional
resistance to corrosion,
high strength, and
adaptability to money-saving
fabricating methods.



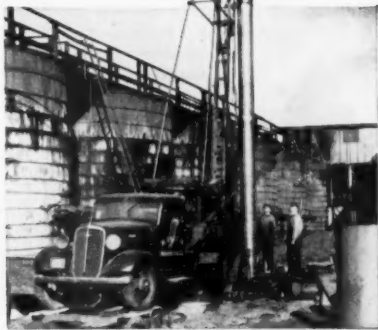
Cross sections, slightly enlarged. Everdur rod-and-wire welds made at 15 to 28 per second.



Well screen being fabricated by unique method of resistance welding.



Micrograph of lengthwise section showing excellent fusion of Everdur resistance welds.



Johnson Well Screen, 16" O.D. 35' long, being lowered into well casing.

Extremely resistant to corrosion. Most water works engineers know that Everdur® is stubbornly resistant to corrosion. Everdur Well Screens have been a standard product of Edward E. Johnson, Inc., St. Paul, Minn., for more than 20 years. Their service records add further confirmation to many other reports proving the suitability of Everdur for water works and sewage treatment equipment.

High strength, too. It's pretty well known, too, that Everdur Alloys are strong and highly resistant to fatigue.

Exceptional weldability. But not everybody

knows that Everdur has unusually good oxy-acetylene and electric welding qualities. That means economy in fabricating lightweight, low cost, wrought metal assemblies.

Everdur is available in practically all wrought forms including sheets, plates, rods and bars; and in structural shapes such as angles, channels, tee shapes and "I" beam sections; also in casting ingots. If you would like to know more, just write to The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

50159

Where corrosion resistance counts
—use Everdur

ANACONDA
COPPER-SILICON ALLOYS

©Reg. U. S. Pat. Off.

When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.

LIFE TIME SERVICE



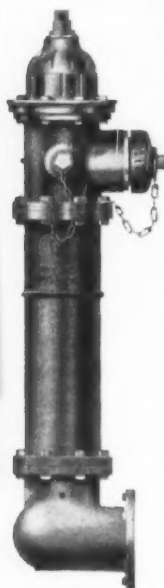
Simple design and rugged construction, skilled workmanship and highest grade materials, account for the fact that there is no repair problem on M & H Hydrants. M & H Hydrant users

of many years standing say there simply never is need for hydrant repairs.

M & H Hydrants are standard A. W. W. A. type. Dry top, revolving head, easy to lubricate. They have extremely high efficiency because the barrel diameter is not reduced and there are no working parts or obstructions in the waterway.

Left: Hub, Flanged, Universal or Mechanical Joint

Water & Sewerage Works Materials, Catalog 34.
Fire Protection Materials, Catalog 40



M & H PRODUCTS INCLUDE

FIRE HYDRANTS
GATE VALVES
WALL CASTINGS
SPECIAL CASTINGS
TAPPING SLEEVE
AND VALVES
CHECK VALVES
FLANGE STANDS
SPRING LEVER
CHECK VALVES
EXTENSION STUBS

ELECTRIC MOTOR
OPERATED VALVES
SHEAR GATES
MUD VALVES
FLAP VALVES
SLUDGE SHOES
FLANGE AND
FLARE FITTINGS
FLANGED FITTINGS
B & S FITTINGS
CUTTING-IN TEES
HYDRAULIC OPERATED
VALVES

**M & H VALVE
AND FITTINGS COMPANY**
ANNISTON, ALABAMA

Septic Tank Design Data

Suggested modifications of the FHA requirements for home septic tanks have been made in a recent report of the Public Health Service. These recommended changes, which are incorporated in a 260-page report, "Studies on Household Sewage Disposal Systems", include the following: Location not less than 10 ft. from a property line and 50 ft. from any water supply. Liquid capacity 500 gals. minimum for 3 bedrooms or less, with a 50% increase for a household garbage grinder. Liquid depth, not less than 3½ ft. Inside horizontal dimension not less than 24 ins. No compartment with capacity less than 125 gals. The tank must be watertight and provided with a manhole or removable cover. Inlet and outlet baffles must be provided.

Experimental work was carried on to determine the effect of salt discharges from home zeolite water softening units. It was found that these do not affect tank operation under normal conditions.

Georgia Water Plants

(Continued from page 38)

verse condition of sand grains is more readily determined visually than is the case with anthracite. It is true the coarser grades of anthracite once advocated will give longer filter runs than the finer grades of sand but the quality of the effluent frequently suffers.

On another point the writer has a much firmer conviction: some form of mechanical agitation in addition to the conventional wash (at rates of 24 to 30 inches rise per minute) is highly desirable. It was a backward step when the profession discarded the principle of the mechanical rakes formerly used in the old circular filters. The sand in many of these old units where the rakes were kept in operation remained remarkably clean, free from incrustations, mud balls and slime growths after twenty or more years operation. Similar results may be obtained in small filters by manually agitating the sand during washing periods using a tool such as a long-handled garden rake.

Clear Water Storage

At plants where the major steps in the purification process are accomplished in single units, ample clear water storage capacity must be provided to permit closing down for such operations as draining, clean-

ing and refilling mixing and settling basins; cleaning filter sand; repairing pumps, rate controllers, etc.; or any other maintenance or repair work necessary. Underwriters' requirements for the most favorable insurance rates applicable to each town should be studied.

Almost without exception these small plants rely upon power purchased from the local distributing company. Power failures, while infrequent, may occur occasionally due to wind or ice storms or other causes. In an area-wide power failure, the smaller towns are usually the last to have power restored so provision for some form of standby pumping equipment is highly desirable. Such equipment may range from a gasoline engine, with belt drive, operating raw water or high service pumps to a complete gasoline driven generator set of sufficient capacity to power pumps and other electrical equipment and to provide lights.

Laboratory Control Tests

The intelligent operation of even the smallest water purification plant without some laboratory control does not appear possible. It is imperative that such tests as those for chlorine residuals, alkalinity, pH and coagulant dosage be conducted as routine while others are desirable or essential at times. Few of these small plant operators have a high degree of chemical education yet many of them learn to perform these control tests with sufficient skill to produce remarkably good effluents. Should unusual treatment problems, beyond their realm of experience, occur they are encouraged to seek help from the State Health Department, their consulting engineers or from experienced operators in neighboring cities or larger towns either or all of whom are usually willing to aid in an emergency.

In conclusion it should be stressed that nothing which has been said is meant to convey the impression that any person is capable of operating a water purification plant. A high degree of technical education is fine but of even more importance are such traits as integrity, dependability and a keen sense of responsibility. Thanks to operators with these latter qualities plus a certain amount of practical mechanical skill, many small towns enjoy the benefits of excellent public water supplies. And for the load they carry these operators are the least appreciated and poorest paid of any public employees!

Every Homelite Product Is Always Better

THREE WAYS

**THE HOMELITE
GASOLINE-ENGINE-DRIVEN
ONE MAN CHAIN SAW**

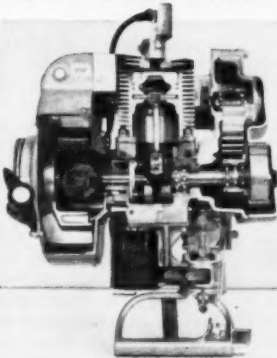


1. PERFORMANCE



Typical of all Homelite products, the Homelite Gasoline-Engine-Driven Chain Saw handles like a feather yet cuts faster and with less trouble . . . whether it's felling, bucking, notching or undercutting . . . than any other saw its size.

2. DEPENDABILITY



Typical, again, of all Homelite products, the Homelite One Man Chain Saw is powerfully driven by the time-proven famous Homelite gasoline engine . . . a simple, foolproof engine that is the exclusive result of Homelite's experience in building close to 300,000 gasoline-engine-driven units.

3. SERVICE



In addition to all the low maintenance features of Homelite Chain Saws . . . the permanent, chrome-plated chain, the liningless automatic clutch, the freedom from gears and oil seals, and the automatic lubrication . . . Homelite service shops the country over bring trained mechanics almost to your door, to keep your Homelite Chain Saw right up to Homelite nation-known performance standards.



Homelite Corporation

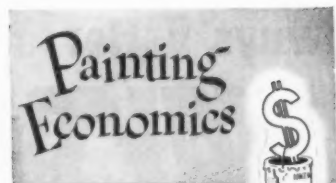


804 RIVERDALE AVENUE, PORT CHESTER, NEW YORK

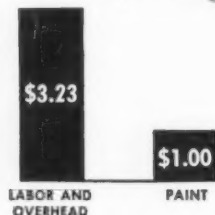
MANUFACTURERS OF HOMELITE CARRYABLE PUMPS • GENERATORS • BLOWERS • CHAIN SAWS • PAVING BREAKERS

STICK TO THE RULE OF THREE

1. Performance
2. Dependability
3. Service . . . and you'll always stick to a Homelite



by DIXON



Something to think about *twice!*

In painting bridges...

it costs, on the average, \$3.23 in labor and overhead for every \$1.00 spent for paint.

Therefore PAINT LIFE is of vital import.

Example: total painting cost - \$5,000. If job lasts 6 years - cost per year \$833. If it lasts 9 years - cost per year only \$556. A SAVING OF OVER 33%!

Typical Dixon Paint Job - 3 1/2-mile New Jersey bridge. Painted 1932. Repainted 1946 to 1949. After 16 years service - Dixon Flake Silica-Graphite Paint was still giving 85% protection.

Write or phone for more facts.



How long will your paint last?

The part *Flake Graphite* plays in painting economy... Overlapping like the protective scales of a fish, the *flake* flakes of Dixon Silica-Graphite produce a lamination within the paint film, forming a coating that is impervious to moisture and fumes.

Specialists in outdoor paints for metal, Dixon puts into these high quality paints...

Almost a Century of Experience

JOSEPH DIXON CRUCIBLE COMPANY, DEPT. C-P
JERSEY CITY 3, NEW JERSEY

DIXON

FLAKE

SILICA GRAPHITE PAINTS

Controlling Sewer Insects and Odors

(Continued from page 48)

drums with the solution. We put these on a small city truck with a gasoline engine driven spray outfit. We use about 100 lbs. pressure and a fine spray nozzle. One street is covered at a time. Manhole covers are not removed but lifted just enough to force the nozzle under them. About one quart of the solution is sprayed into each manhole. It forms a fog that penetrates into cracks and crevices and even extends through the sewers.

In sewer lines where Cloroben is used for the treatment of sewage, it is normally unnecessary to spray. The fumes, at least up-sewer, where concentrations are higher, appear sufficiently strong to eliminate roach and other insect infestation. Our spraying efforts are therefore limited to laterals that do not receive any direct Cloroben dosage. A check is made about a week after the manhole is sprayed. We rarely find survivors, but if we do, that particular manhole receives a second treatment. Roaches will return, of course, just like a kitchen floor will not stay clean forever because of a single good scrubbing. Nevertheless, after such a spray treatment, it takes a long time before roaches build up again in the same sewer. Meanwhile we are training personnel to check regularly on these unwelcome insects and to exterminate those that make an appearance.

In fact, we have become interested in cockroaches and we have read much literature regarding them. Recent research tends to show that roaches are able to carry the organisms of many diseases. In "Insect Microbiology", by Prof. Steinhilber of Cornell, it is stated that the causative agents of anthrax, undulant fever, tetanus, diphtheria, typhoid, tuberculosis and dysentery have been found in the feces of cockroaches. Prof. O. B. Williams and others of the University of Texas made a study of 41 roaches, mostly collected in or near sewer manholes. All 41 were shown to be carriers of enteric organisms, some of which were definitely pathogens.

It is believed that health officers, in the light of these reports, should adopt a less tolerant attitude toward roaches. For our part, we have found out how we can control them and we intend to continue our program. We believe we are the first city to initiate a complete sewer insect extermination program.

CUT COSTS

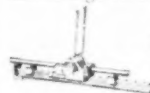
ON UNDERGROUND

PIPING JOBS



...with a GREENLEE PIPE PUSHER

Installing pipe underground is quick and simple this way. With a GREENLEE Hydraulic Pipe Pusher one man pushes pipe through the ground—under streets, railways, walks, lawns, floors. Saves time, cuts costs through elimination of extensive ditching as just a short trench accommodates the Pusher. No tearing up of pavement, lawns, floors... eliminates tunneling, back-filling, tamping, repaving. Cuts job time to a fraction. Pusher often pays for itself through timesavings on first job or two.



No. 790 GREENLEE PUSHER
For 3 to 4-inch pipe. Six speeds - 5,600 to 40,000 lbs. pushing pressure.



No. 795 GREENLEE PUSHER
For pipe larger than 4-inch. Concrete sewer pipe, large drainage ducts. Six speeds - 25,000 to 150,000 lbs. pushing pressure.

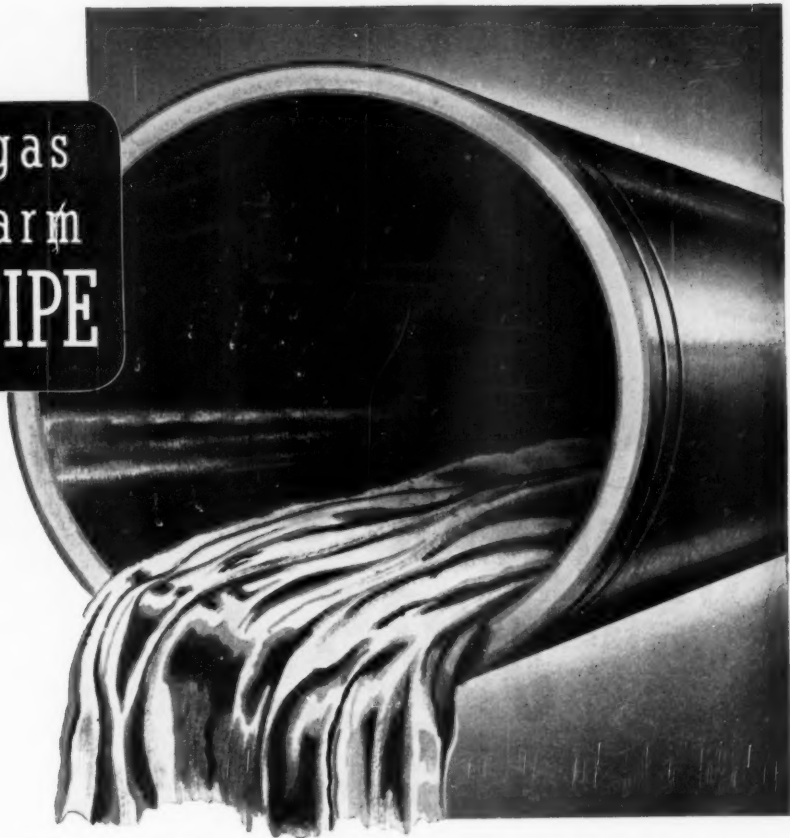


POWER PUMP For both sizes of GREENLEE Pushers. Pushes pipe at rate of two feet per minute.



Get facts on timesaving Greenlee tools now. Write Greenlee Tool Co., Division of Greenlee Bros. & Co., 2046 Columbia Avenue, Rockford, Illinois, U. S. A.

sewer gas
can't harm
CLAY PIPE



The upper invert of Vitrified Clay Pipe is safe from the destructive, corroding acid fumes that rise from sewage. Maybe you've noticed how some sewers wear out *from the top down*. That's because the gases found in most sewer lines are often more harmful than the waste itself. But Vitrified Clay Pipe is completely safe from fumes and acids alike. It can't wear out, because it's chemically inert — top and bottom, inside and outside, through and through. Be sure by specifying Clay — the only pipe that never wears out.

**NATIONAL CLAY PIPE
MANUFACTURERS, INC.**

703 Ninth and Hill Bldg., Los Angeles 15, Calif.
1105 Huntington Bank Bldg., Columbus 15, O.
100 N. LaSalle St., Rm. 2100, Chicago 2, Ill.
206 Connally Bldg., Atlanta 3, Ga.



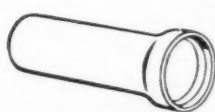
SPECIFY

Vitrified

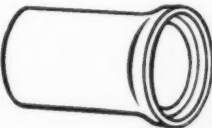
CLAY



PIPE



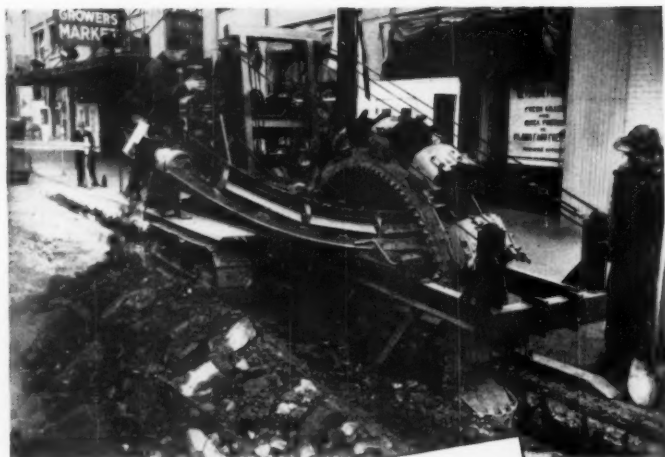
**STANDARD-
STRENGTH
CLAY PIPE**



**EXTRA-STRENGTH
CLAY PIPE**



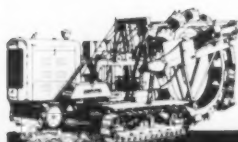
**PERFORATED
CLAY PIPE**



CLEVELANDS
HAVE THE **GUTS**

**that pay off
on the trenching jobs**

Your CLEVELANDS give you that extra toughness and ruggedness that make the difference between profit and loss under rough field conditions of sticky mud, frozen rocky ground or broken hilly country. CLEVELANDS bring you plenty of brute power, economically applied in a higher-capacity wheel-type design and delivered through a wide range of transmission-controlled crawler and cutting speed combinations. CLEVELANDS special all-welded construction means a wide margin of safety on stress and strain without excess weight. Maintenance is remarkably low. The few necessary repairs are quickly handled in the field with "unit assemblies" from your nearby CLEVELAND distributor. See him today for details or write direct.



THE CLEVELAND TRENCHER CO.

20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO



New Diesel Raises Plant Efficiency

(Continued from page 31)

12 months. With the new engine, 4500 rated horsepower-hours were obtained per gallon of lubricating oil.

The cooling system at Newton Falls is reported to be the first of its kind in Ohio. Engine jacket water and lubricating oil are both cooled by raw water from the river. The water flows by gravity from the river through a 24-inch pipe to a sump under the pump house. The bottom of this sump is four feet lower than the bottom of the river. Three turbine pumps of 5-hp capacity each, circulate this water through four vertical, open-head Vogt type coolers with enough capacity for engines up to 5000-hp. output. Three of the Vogt coolers are used for the engine jacket water and the fourth cools water for the shell and tube type lube oil cooler. During summer operation when cooling requirements are increased, the raw river water enters the coolers at approximately 70° F. and leaves at 105° F. The jacket water enters the coolers at 150° F. and returns to the engine at 135° F. The river water passes from the cooler to a discharge chamber from which it returns by gravity to the river. The engine jacket water is circulated by three 450-gpm. pumps.

The power plant is in charge of T. S. Kistler who is superintendent of both the power plant and adjoining water works. Consulting engineers for the Newton Falls installation were Carl J. Simon and Associates, Van Wert, Ohio.

Industrial Waste Problems in San Francisco

An industrial waste survey was initiated by San Francisco, Calif., about two years ago. In the south-east district, 177 industries were visited, of which 94 discharged industrial wastes. Of these, the wastes from 12 required no treatment; present treatment facilities were adequate in 21; and additional treatment was required in 61 industries contributing about 3.17 mgd of wastes. In the North Point District, 588 industries were surveyed of which 309 had industrial wastes. The wastes from 70 of these required no treatment; present treatment was adequate at 54; and additional treatment was found necessary at 185 industries contributing 5.29 mgd of wastes.

Public Works ENGINEERING DATA

Cost of Laying Water Pipe

Costs of laying water mains in Augusta, Maine, during 1949, were as follows: 1-inch, 208 ft., cost of materials 37¢ and of labor 57¢; total cost per foot 94¢. 2-inch, 294 ft., cost of materials 66¢, of labor 72¢ and of equipment 16¢; total cost per ft. \$1.54. 6-inch, 6,197 ft., materials \$2.42, labor 71¢ and equipment 12¢, total cost per foot \$3.25. 8-inch, 2,547 ft., materials \$3.25, labor \$1.69 and equipment 47¢; total cost \$5.41 per ft.

Sedimentation Tank Performance

During the year ending June 30, 1949, the sedimentation tank performance at Detroit, Michigan, was as follows: Suspended Solids, average influent 227.9 ppm; average effluent 108.3 ppm; removal 52.4%. BOD, average influent, 139.5 ppm; average effluent, 78 ppm; removal 43.8%. Average removal of settleable solids was 75.9%. Average detention time in the sedimentation tanks was 1.2 hrs., but varied from 1.5 hrs. to 1.0 hr.

Preventing Edge Raveling of Asphalt Pavement

Where attempts are made to produce a feather edge when resurfacing with asphalt material, raveling may occur when the edge of the new surfacing is too thin. San Francisco has found that it is better to leave a raised edge, from $\frac{1}{4}$ to $\frac{3}{8}$ inch thick, with a 3-inch to 6-inch strip of tack coat left exposed. The raised edge does not interfere with traffic and during warm weather is worked down without raveling so as to leave a joint that is almost invisible.

Dual Fuel Diesels Produce Larger Profits

The Municipal power plant at La Junta, Colorado converted its 1,750-hp, 10-cylinder, 16 x 20, Fairbanks, Morse diesel to dual fuel operation a year ago. It has since added a new 2,000 hp. FM dual fuel engine, bringing plant capacity to 6,725 hp. Other older diesels are being converted to dual fuel with a fuel saving estimated to be more than \$50,000 per year.

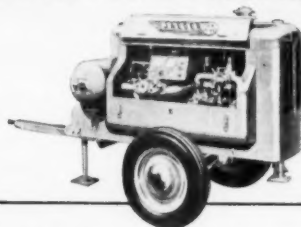
During 1949, the 1,750-hp converted diesel was the mainstay of the plant, operating virtually all of the time and producing nearly 6 million kwh. Costs of gas and fuel oil were cut to 4 mills per kwh, and further refinements are expected to improve this figure.

In addition to providing the usual free services, estimated to be worth \$20,000 per year; to paying taxes of nearly \$10,000 a year; and to giving successive rate reductions, the municipally owned diesels in 9½ years have earned a net profit of \$664,573.

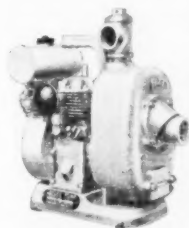
The Utilities System is managed by D. J. Goodhue under the supervision of a Power Board consisting of Mayor M. B. Chase, three elected members and a representative of the City Council.

Jaeger "new standard" Model 75 sells at price of old, small Model 60 but does a lot more work.

BEST BUY in AIR COMPRESSORS



Operates a heavy concrete breaker or sheeting driver at full 90 lbs. pressure, which no 60 ft. unit can do, runs 2 clay diggers instead of one, or 3 backfill tampers instead of 2—all at full pressure. Weighs no more than old 60, uses no more fuel unless more air is called for. Send for Catalog.



Pump 5100 gallons an hour with famous Jaeger "Bantam." Carry it in one hand, ready to prime and pump as soon as you start the engine. Aluminum alloy with replaceable liner. Electric powered if desired.

Sold, rented in 130 cities.

Send for Catalog

THE JAEGER MACHINE COMPANY
Columbus 16, Ohio

CARTER'S PNEUMATIC SEWAGE EJECTOR

for continuous, trouble-free, economical handling of sewage lift problems

For day-in-and-day-out 100% sewage boosting you can't afford not to consider Carter's pneumatic sewage ejectors. They practically pay for themselves by elimination of the costly auxiliary screening equipment required with centrifugal pumps. Solids and trash up to the size of the inlet and discharge valves are easily handled.

No moving parts—no clogging or binding. Pots are either copper bearing, electrically-welded steel or cast iron—to your specifications. Hermetically sealed—completely eliminate stuffing box leaks and toxic gas dangers. Bronze mounted double disc gates and swing check valves. Rotary type air compressors of high volumetric efficiency. Fully automatic controls.

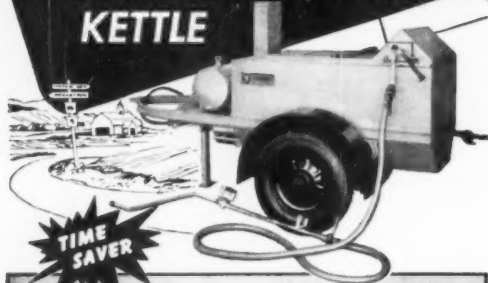
Capacities—30 to 250
GPM

Write today—give your specific waste problems, and we'll promptly furnish a detailed reply.

188 Atlantic St., Hackensack, N.J.

RALPH B. CARTER CO.

HIGHWAYS, STREETS AND ROADS NEED THE LITTLEFORD 84-HD KETTLE



84-HD Kettle using Hand Spray Attachment for Patch Work.

When the Littleford 84-HD Kettle is on a road maintenance job its faster heating, efficiency in operation and patented features make it a Time Saver, Cost Saver and Road Saver. No other Kettle has ever been designed with such painstaking effort as the 84-HD. This Littleford unit has patented features such as Double Heat Circulation System, which utilizes the entire heat of the Burner, and Screened Reservoir, which assures a continuous flow of hot materials even when cold materials are added during the heating. These features are the reason why the 84-HD has repaired more Roads, Streets and Highways than any other kettle on the market. To make the 84-HD even more efficient, a Hand Spray or Motor Spray Attachment can be added to this Kettle.

**ROAD
SAVER**

For further details see your nearest
Littleford Equipment Distributor.

MANUFACTURERS OF

"Tanker" Steam Heaters
"Kwik Melter" Roofers Kettles
Trail O Rollers

"Spray Master" Pressure Distributors
Highway Brooms
Tool Heaters
Trail O Distributors

Asphalt Supply Tanks
No. 101 Utility Spray Tanks
BH HD Asphalt Kettles



LITTLEFORD

LITTLEFORD BROS., INC.
452 E. Pearl St., Cincinnati 2, Ohio

Power From Sludge Gas

Power developed by engines using digester gas for fuel is now "big business," and Illinois has fifteen such installations of one or more gas engines. In nearly all cases these investments have paid for themselves many times, some plants being entirely free from any source of standby power. Illinois "Digester."

Average Bid Prices, FAP, during 1949

Average bid prices on primary projects, Federal-Aid highway construction contracts awarded during the calendar year 1949 are as follows: Borrow, 54¢ per cu. yd.; common roadway excavation, 32¢; unclassified roadway excavation, 42¢; solid rock, \$1.14; structural excavation, common, dry, \$2.94; structural excavation, unclassified, \$3.47. Gravel and clay-gravel bases in place, 47¢ per sq. yd. or \$1.19 per cu. yd.; portland cement base \$3.77 per sq. yd.; surfaces, gravel and clay-gravel, in place, 15¢ per sq. yd. or \$1.32 per cu. yd.; portland cement concrete, \$3.25 per sq. yd.

Bituminous surface treatment, per sq. yd. 25¢; aggregate per ton, \$3.63; asphalt, per gal., 15¢. Bituminous road mix, per sq. yd., 48¢; per ton of aggregate \$2.29; per gal. of asphalt, 14¢. Bituminous concrete, per sq. yd. \$1.01. Pipe, cast iron 18-inch, \$12.28 per ft.; clay 6-inch, \$1.16; concrete reinforced 24-inch, \$5.12; galvanized iron 24-inch \$4.62. Structural concrete, superstructures, \$46.61 per cu. yd.; substructures, \$45.61; foundations and footings, \$41.93.

Sludge Data From Detroit

During the past fiscal year in Detroit, sludge pumped to the digesters contained 10.4% solids; of these solids 59.2% were volatile. Gas yield per pound of solids was 4.05 cu. ft.; per pound of volatile solids added, production was 6.88 cu. ft.; and per pound of volatiles consumed, 20.70 cu. ft.

Bottled Gas for Making Pipe Joints

Bottled gas has been used advantageously for melting lead for making pipe joints at the Marion, O., Water Co. (American Water Works, Inc.), of which L. Otis Porter is manager. Using propane gas, it was found possible to heat a full pot of lead ready to use in less than 20 minutes; also more positive control of the temperature was possible. This device has not yet been used for melting sulphur compound joint material, but is believed entirely suitable.

Propane gas was also used for burning out old joints, both lead and sulphur compound, and proved very successful.

A record of cost was kept during the first stages of the work. It was found that the cost of operation while using the bottled gas was less than 20 cents per hour as compared to 33 cents per hour for the old type torches using kerosene.

A Jeep Equipped for All-Around Work

The Cleveland, O., Division of Parks has fitted out a jeep with special equipment to do all sorts of work. Equipment includes a Schramm air compressor, an Onan 110-volt AC distributor and a front-mounted 2½-inch pump. The air compressor is used to operate pneumatic tools and the generator to run electric tools. The pump is used for pumping out wells, sumps, catch-basins, septic tanks, etc.

PUBLIC WORKS DIGESTS

SEWERAGE AND REFUSE . . 57 • HIGHWAYS AND AIRPORTS . . 64 • WATER WORKS . . 70

This section digests and briefs the important articles appearing in the periodicals that reached this office prior to the 15th of the previous month. Appended are Bibliographies of all principal articles in these publications.

THE SEWERAGE AND REFUSE DIGEST

Housing Trickling Filters

Minnesota has for many years required that biological filters be housed. It gets cold in that state. Biological life increases in activity as temperature rises above freezing point. Housing increases upward ventilation through the filter because of the greater height of the air outlet in the roof of the house. Housing conceals objectionable appearance, aids odor control, lessens fly nuisance and unnecessary insect contact with filter flora. The cost of housing is much less with high-rate filters than with the larger low-rate ones. It is customary to use wood roofs for spans up to 40 ft. and prestressed concrete domes for larger ones.

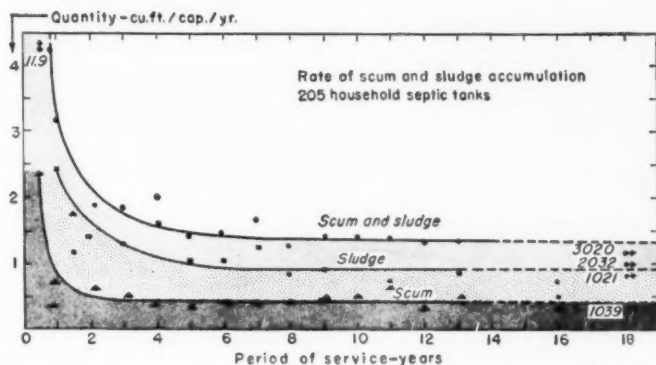
Hugh C. Leabee and Robert J. Ellison — "The Case for Housing Trickling Filters;" *PUBLIC WORKS*, May.

Septic Tank Design and Operation

The U. S. Public Health Service made a comprehensive investigation into all phases of septic tank practice in 1947 and 1948. Their findings, as reported, may be modified by further investigations of the effect of soil-absorbing characteristics for septic tank effluents. The first-stage findings are summarized as follows:

The functions of household septic tanks are settling, digesting and sludge storage. Variations in shape and depth of uncompartimented tank appear to affect efficiency only slightly if tank capacity is adequate.

Compartmentation is desirable. The study is not conclusive as to



Courtesy Engineering News-Record

how it should be provided or as to optimum shape, size or number. Provision for cleaning of each compartment must be made.

No unequivocal conclusion can be drawn as to minimum design capacity for septic tanks. Tanks are seldom cleaned until trouble develops. Ample capacity must be provided to assure trouble-free periods of reasonable length and to prevent frequent and progressive damage to the effluent-absorption system due to sludge discharge from the tank. For these reasons, a minimum tank capacity of 500 gal. is recommended.

Data from 205 septic tanks of various shapes and sizes, serving single-family residences in various parts of the country showed that during the five or six years after start of operation or cleaning—average per-capita accumulation of sludge and scum can be estimated from the formula:

$V = 17 + 7.5 Y$
in which

V = volume of sludge and scum in gallons per capita

Y = years of service since cleaning. This equation holds for tanks with about 125-gal. liquid capacity. Larger solids accumulation may be expected in larger tanks, smaller accumulations in smaller ones.

Addition of yeast does not appear to accelerate sludge digestion. Seeding of tanks with digested sludge is advantageous.

Carefully constructed household septic-tank systems with gravel-packed tile lines and insulation of pipes under driveways will rarely freeze if kept in continuous operation. This applies even if tiles are laid above frost-penetration level.

"Designing and Operating Septic Tanks for Homes;" *Engineering News-Record*, April 20.

Disposal of Oil Emulsions

The best method of minimizing the problem of disposing of oil emulsions is to aerate them and keep

them in motion as much as possible; bleed from the system as much emulsion as possible for other uses; and utilize the flotation unit for reclamation of spent washing solutions and emulsions used elsewhere.

M. A. Pratt—"Extended Use of Oil Emulsions to Minimize Disposal Problems;" *Sewage and Industrial Wastes*, March.

Wastes from Chicken Packing Plants

In a chicken packing plant, chickens are kept for about 3 days and then killed, bled, picked, cleaned but

not eviscerated, chilled and frozen. Before being killed they are kept in wire cages in "batteries", and by far the greatest amount of B.O.D. and suspended solids in pounds per 1,000 chickens averaging 3 lb. in weight, is from the battery and feeding station. Some plants remove as much as possible of this before washing down the floors, others do not. The liquid wastes from the former contain only about 1/3 as much B.O.D. and suspended solids as those from the latter. Plants vary widely in the amount of water used per unit of 1,000 chickens—from

2,600 gal. to 7,000 gal. in the plants investigated in a study for the Delaware State Board of Health. The population equivalents per 1,000 chickens where all the manure is removed by the waste water averaged 500 for B.O.D. and 800 for s.s., and averaged 53 and 39 respectively where all the manure is removed before washing. Sedimentation removed an average of 85%. The sludge putrefies rapidly; digests readily. Sand filtration of settled wastes results in rapid clogging of the sand. High-rate trickling filters are the most feasible and economical method of secondary treatment.

H. Heukelekian, H. E. Orford and J. L. Cherry—"The Characteristics of Wastes from Chicken Packing Plants;" *Sewage and Industrial Wastes*, April.

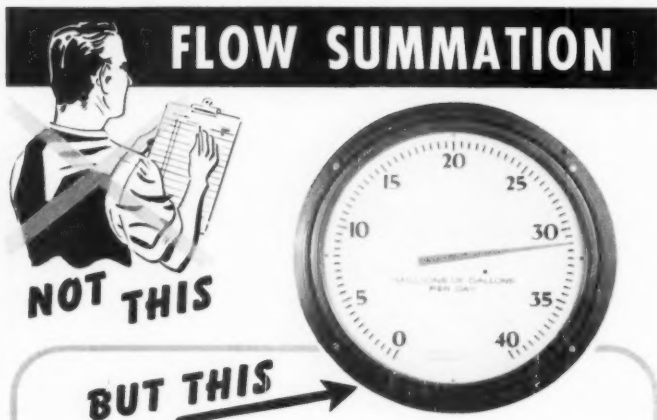
In a study conducted in the Kansas River basin by the U. S. Public Health Service, the waste flow from four plants was found to vary from 545 to 1850 gal. per 1,000 chickens, and the population equivalent averaged 110 on a B.O.D. basis and 70 on a SS basis, if blood and manure be included in the waste water.

Ralph Porges—"Wastes from Poultry Dressing Establishments;" *Sewage and Industrial Wastes*, April.

Air Diffusers for Activated Sludge

Several years ago, the engineers of the activated sludge plant of the Sanitary District of Chicago began a series of tests to determine what type and details of diffusers would be most satisfactory. Each of 8 tanks of the plant was fitted with a different diffuser system, and all were operated in parallel simultaneously for four or five years. The test conditions were: Equal quantities of identical mixed liquor influent to all tanks; uniform distribution of air throughout the length of each tank to insure uniform mixing; and the quantity of air to each tank adjusted to give the same D. O. at the effluents. Plates of 40, 80 and 120 permeability were used; and porous tubes of 40, 65 and 80 perm. each in several different arrangements; and pipes with slots 0.04" wide screwed into headers.

Some of the conclusions reached were: there was no difference in air economy between plates of different permeabilities. The air economy improved during the first year of service. It improved with increase in number of diffusers. Vertical plates show less air economy than horizontal ones. Power saved by reduced submergence is offset by the greater quantity of air required. Slotted



Pneumatic summation with Builders air actuated gauges and controls means a smooth-running, efficient filter plant. Air operation offers extreme flexibility and almost unlimited range of functions—without the complications of cables, wires, cords or pulleys. The summation of many individual flow rates is accomplished by a simple, accurate air-actuated Builders summation unit. A single pressure, representing the total flow rate, may be transmitted through 1/4" copper tubing to indicators or recorders in a central operating gallery or chemical building. Precision, operating convenience, and dependability make Builders air-operated equipment the choice of the nation's most modern water treatment plants, including the great South District Filtration Plant of Chicago—world's largest filter plant, and the LaVerne Softening Plant of the Metropolitan Water District of Southern California, world's largest softening plant.

For complete information and Bulletin 285-G1, address Builders-Providence, Inc. (Division of Builders Iron Foundry), 356 Harris Ave., Providence 1, R. I.

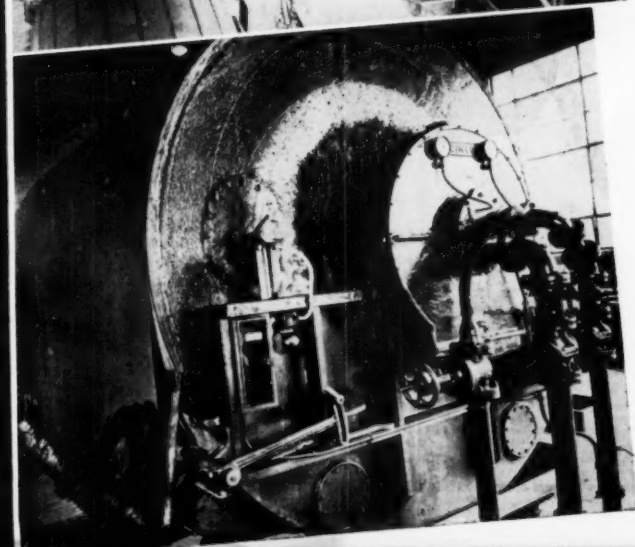
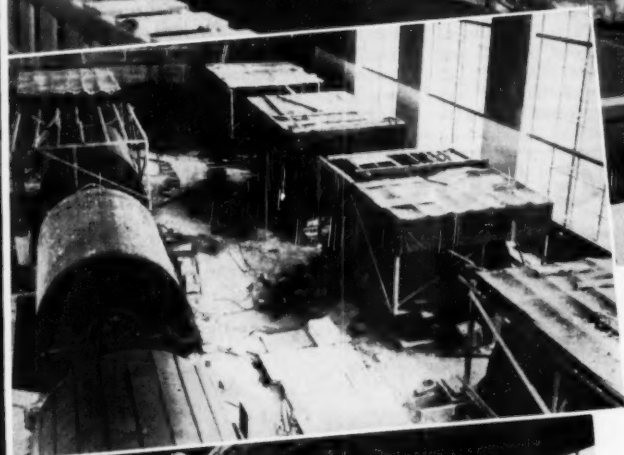
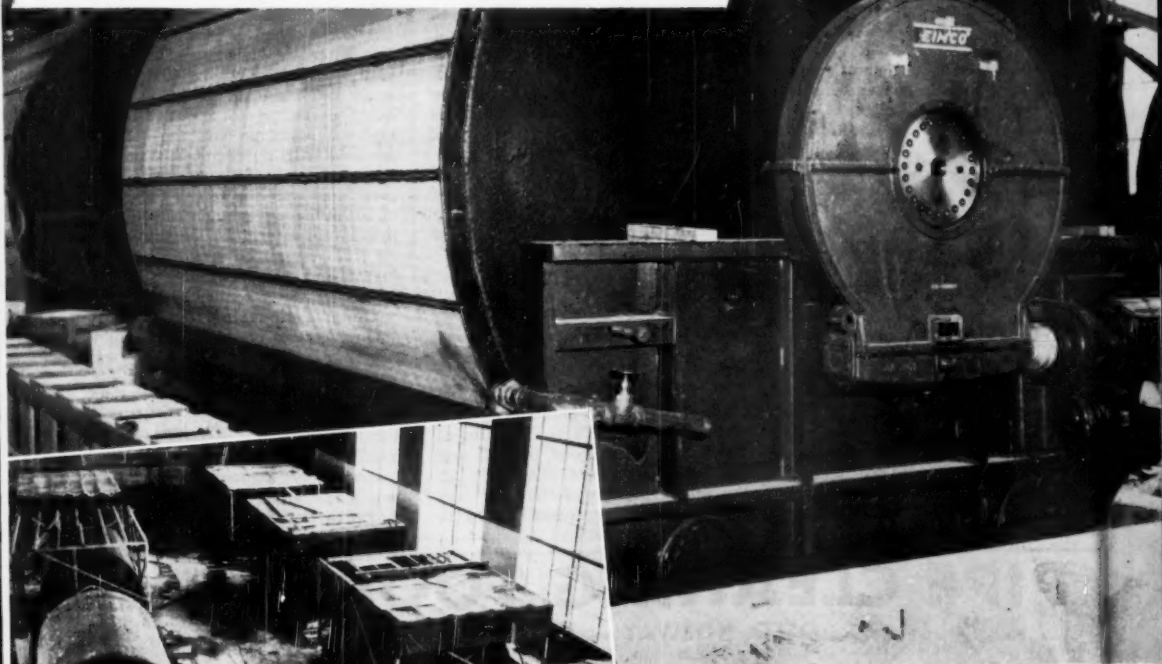
BUILDERS PRODUCTS

The Venturi Meter • Propello and Orifice Meters • Kennison Nozzles • Venturi Filter Controllers and Gauges • Conveyo Meters • Type M and Flo-Watch Instruments • Wheeler Filter Bottoms • Master Controllers • Filter Operating Tables • Manometers • Chlorinizers—Chlorine Gas Feeders • Chronoflo Telemeters

BUILDERS IRON **PROVIDENCE**
Instruments

When writing, we will appreciate your mentioning PUBLIC WORKS

EIMCO Filters Will Dewater Los Angeles Sewage Sludge



ABOVE—Eimco 12' dia. x 16' face Sewage Sludge Filter in Los Angeles Filter Station. LEFT—View in filter station showing 8 of 12 Eimco Filters. BELOW—Eimco 12' dia. x 16' face sewage sludge filter in operation. NOTE: Dewatered sludge comes off in sheet.

Eimco Dependable Vacuum Filters will provide the city of Los Angeles with a new type of protection — protection against contamination on the beaches.

Actual separation of solid matter from the millions of gallons of sewage water flowing daily into the Hyperion treatment plant is accomplished efficiently, and dewatered on Eimco Continuous Vacuum Filters.

When any city plans sewage treatment, the city engineer will find a helpful assistant by calling an Eimco engineer . . . no obligation of course.

EIMCO
THE EIMCO CORPORATION
The World's Largest Manufacturers of Rotating and Lifting Machinery
 EXECUTIVE OFFICES AND FACTORIES — SALT LAKE CITY 8, UTAH, U.S.A.
 BRANCHES: NEW YORK, CHICAGO, BIRMINGHAM, EL PASO, BERKELEY, DULUTH
 AFFILIATED COMPANIES: SOCIETE EIMCO (PARIS), FRANCE
 EIMCO (GREAT BRITAIN) LTD., LONDON, ENGLAND
 AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

tube diffusers are inferior to porous diffusers in air economy. The life of a porous diffuser before clogging becomes impermissible is determined by the total amount of air passed rather than by length of time in service, and is inversely proportional to the amount of dust in the air. The clogging rate is inversely proportional to the permeability rating.

An extension to the plant placed in operation in 1949 contains double air filtration; porous plates are of 80-permeability, except one tank of 120 for further testing; the plate ratio is 1:11.7, and the average operating rate is about 3 c.f.m. per plate.

Norval E. Anderson—"Tests and Studies on Air Diffusers for Activated Sludge;" *Sewage and Industrial Wastes*, April.

State Control of Industrial Wastes

The Washington State Pollution Control Commission is believed to be the first agency of its kind to establish procedures for in-plant prevention and reduction of industrial waste discharges to control stream pollution. The Commission's policy is to refrain from requiring

waste treatment until waste reduction has been given a fair trial. Minimum requirements have been set for slaughter houses and meat packing plants, poultry killing, milk and milk products plants, canneries, wineries, breweries, wood handling mills, oil handling, tanneries, beet sugar factories, coal washeries, gravel washeries, flax processing, dehydration of vegetables, metal industries, and pulp and paper mills. In general, the aim is to eliminate from the plant effluent as much as possible of the solid matter. Floors are to be dry-cleaned before washing down; large solids to be screened out of effluent waters; and pieces of vegetables, blood, manure, grease etc., to be collected and disposed of separately.

"Minimum Requirements for the Control of Industrial Wastes;" *Sewage and Industrial Wastes*, April.

High-Rate Filters for Formaldehyde Wastes

Wastes from a plant producing synthetic resins and constituent products contained oils, phenols and other wastes on the acid side, but the major portion of the load was formaldehyde concentrations up to

5,000 ppm. Every known method of chemical treatment for destroying the formaldehyde was studied in the laboratory but none found satisfactory. Attempts to break it down by anaerobic digestion failed. A low-rate trickling filter gave good results for about two months, but then all the bacteria died in about two days. Then a high-rate trickling filter was tried, operated at a rate of 50 mgad with a 40 to 1 recycle ratio; the pH of the solution being corrected to about 7.0 with aqueous ammonia and the solution fortified with nutrients. It was suggested that the failure of the low-rate filter was due to the formation of insoluble compounds causing the death of bacteria by cutting them off from their food supply; whereas in the high-rate filter the accumulation is greatly reduced because of continuous sloughing.

On the basis of this study a plant was built in 1948. The filter was made with 6 ft. depth of 5"-3" stone, designed for a loading of 2.8 lb. per cu. yd. and 52 mgad. The settling basin was designed for 15 min. retention. The filtration was followed by lagooning. During a year's operation, formaldehyde removal by the filter varied from 15%

PIPE CLEANING TOOLS

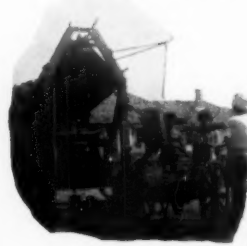
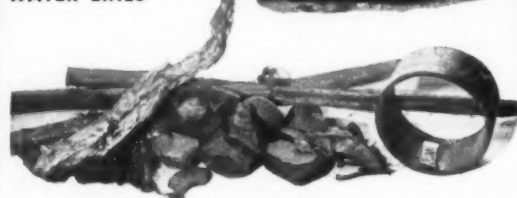
AROUND
the WORLD

OSLO, NORWAY — SINGAPORE, M. P.



"All this debris taken from 10" pipe. Section shows perfect job."

WATER LINES



"Flexible" Power Bucket Machines. Power Drive, Rods and Tools make work easier in the Orient too.

SEWER LINES



"FLEXIBLES" IN OSLO AND SINGAPORE — AS WELL AS IN THE U. S. A.

"FLEXIBLE"

UNDERGROUND PIPE CLEANING CO.

SEWER-ROD EQUIPMENT CO.

9059 VENICE BOULEVARD, LOS ANGELES 34, CALIFORNIA

141 W. Jackson Blvd.
Chicago, Ill.
Box 167
Los Nietos, Calif.

401 Broadway
New York 13
41 Greenway St.
Hamden, Conn.

147 Hillside Ter.
Irving, N. J.
3786 Durango Ave.
Los Angeles 34, Calif.

P. O. Box 165
Atlanta
709 House Bldg.
Pittsburgh 22, Pa.

P. O. Box 465
Memphis, Tenn.
4455 S. E. 24th Ave.
Portland 2, Ore.

801 E. Excelsior Blvd.
Hopkins, Minn.
4455 S. E. 24th Ave.
Portland 2, Ore.

29 Cerdan Ave.
Rosindale 31, Mass.
P. O. Box 447
Lancaster, Texas

When writing, we will appreciate your mentioning PUBLIC WORKS

with a formaldehyde concentration of 266 ppm to 28% with a 360 ppm concentration. There was no filter fly problem.

B. W. Dickerson—"High Rate Tricking Filter Operation on Formaldehyde Wastes;"—*Sewage and Industrial Wastes*, April.

Composting Digested Sludge

Austin, Texas, grinds in a hammer mill the sludge from its activated sludge plant and sells the product for fertilizer, the demand for it exceeding the supply. Studies have been made to find an economical method of removing the odor and improving the fertilizer value. The method selected was to mix sawdust with the sludge on the drying beds. It can then be stripped 1 to 3 weeks sooner than if not so treated. It is piled for aging and turned several times to obtain rapid and true composting.

A. H. Ullrich and M. W. Smith—"Experiments in Composting Digested Sludge at Austin, Tex.;"—*Sewage and Industrial Wastes*, April.

BIBLIOGRAPHY

American City

How the Contact Aeration Plant Serves Manassas, Va. By James W. Ritter, Jr., Town Mgr. May, Pp. 106-107.
Detergents and Foaming in Sewage Treatment. By W. Wesley Eckenfelder, Cons. Chemist, and John W. Hood, Supt. of Sew. Treat., Ridgewood, N. J. May, Pp. 132-133.

Engineering News-Record

Fermentation for Garbage Disposal. By Raymond A. Williams, Dir. of Pub. Service, Miami, Fla. April 13, Pp. 36-37.
Designing and Operating Septic Tanks for Homes. Based on Federal Security Agency's report. April 20, Pp. 32-35.

Public Works

Dewatering Sewage and Industrial Waste Sludges With Vacuum Filters. May, Pp. 44-46.
The Case for Housing Tricking Filters. By Hugh C. Leiber, San. Engr., and Robert J. Ellison, Banister Engrg. Co. May, Pp. 53.

Sewage and Industrial Wastes

The Oxygen Requirements of Activated Sludge Determined by Manometric Methods. By F. S. S. Dawson and S. H. Jenkins, Chemists, Tame and Rea Distr. Drainage Bd. April, Pp. 490-507.
Study of the Nitrification Phase of the B.O.D. Test. By A. M. Buswell, Irene Van Meter and J. R. Gerke, Illinois State Water Survey. April, Pp. 508-513.
Minimum Requirements for the Control of Industrial Wastes of Washington State Pollution Control Commission. April, Pp. 514-520.
The Characteristics of Wastes From Chicken Packing Plants. By H. Hewkeleian and H. E. Orford, Rutgers University, and J. L. Cherry, Delaware Bd. of Health. April, Pp. 521-530.
Wastes From Poultry Dressing Establishments. By Ralph Porces, U.S.P.H.S. April, Pp. 531-535.
High-Rate Tricking Filter Operation on Formaldehyde Wastes. By B. W. Dickerson, San. Engr., Hercules Powder Co. April, Pp. 536-548.
Industrial Wastes Disposal at Pittsburgh. By John F. Laboon, Allegheny Co. San. Authority. April, Pp. 549-554.
Gas Engine Experience at Butler, Pa. By T. R. Haseltine, Cons. Engr. April, Pp. 556-561.

HOW TO MEASURE TRADE WASTES ACCURATELY

In accordance with anti-pollution laws recently enacted by numerous states, most industries now face the task of purifying their plant wastes before discharging them into adjacent streams and rivers.

This purification process usually requires special plant construction, and invariably the necessity exists of obtaining flow data, whether this be the simple indication of flow rate or a more permanent method of recording and totalizing the flow through the plant. With purification processes of this kind, measuring equipment usually is located at the point of discharge of partially filled pipe or in open channels, where low heads or pressures exist and where measurement is either difficult or impossible when using standard forms of measuring instruments.

The Simplex type S Parabolic flume, either alone or in conjunction with a Simplex type HF water float operated meter, is the ready answer to this measuring problem. Compact in design, with no pockets or grooves to catch sediment or solids, and capable of operating under low flow conditions, the unit measures over long ranges, from maximum to 5% of maximum capacity.

Available in standard pipe sizes of 6 inches to 36 inches diameter inclusive, the flume can be attached to even larger sizes by means of eccentric reducers.

IT'S SIMPLEX
IT'S ACCURATE



Write for Bulletin 210, to the
Simplex Valve & Meter Company,
Dept. 6, 6750 Upland Street,
Philadelphia 42, Pa.

SIMPLEX

VALVE AND METER COMPANY

When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.

A NECESSITY FOR EVERY MUNICIPALITY



The
NETCO CATCH BASIN
CLEANER
with pneumatic controls

Simple • Positive Powerful PNEUMATIC BUCKETS

Two types of Netco Buckets are available with large capacity: (1) An orange peel type which operates through an opening as small as 16 inches. (2) a clamshell designed to operate through rectangular frames as small as 13½" x 19".



✓ Check these features

- The Netco Catch Basin Cleaner can be mounted on any short wheel base truck having at least 8 ft. in back of cab. You can purchase unit separately and mount on your own chassis.
- The Netco Unit can be removed from truck and chassis in 30 minutes.
- The Netco can be operated continuously because the material removed from catch basins is loaded into other trucks. This unit will average 20 to 30 catch basins per 8 hour day.
- The Netco Bucket closes pneumatically, assuring positive and maximum digging efficiency.
- Positive and simple control of pneumatic bucket, boom swing, hoist clutch and boom brake by compressed air.
- The Bucket is lowered and raised by one cable. Only one hose is required to close it, and it is opened by powerful spring action.
- The Netco has a hoisting capacity up to 1500 lbs.

These Cities and Many Others Own
One or More
Netco Catch Basin Cleaners

Boston, Mass.	East Cleveland, Ohio
New York City, N. Y.	Binghamton, N. Y.
Indianapolis, Ind.	Chicago, Ill.
New Brunswick, N. J.	Philadelphia, Pa.
Harrison, N. J.	Niles, Ohio



NETCO DIVISION

CLARK-WILCOX COMPANY
118 Western Avenue
Boston 34, Massachusetts



Experiments in Composting Digested Sludge at Austin, Tex. By A. H. Ulrich and M. W. Smith, Supt. and Asst. Supt. of Sew. Treat., Austin. April, Pp. 567-570.

Sewage and Industrial Wastes Engineering

Tips on Sewage Works Design and Operation. By LeRoy W. Van Kleeck, Prin. San. Engr., Conn. State Dept. of Health. May, Pp. 246-249, 270.
Spherical Pressure Vessels for Sewage Gas. By L. L. Wissmiller, Chicago Bridge & Iron Co. May, Pp. 250-252.
Fire and Explosion Hazards in Sewage Works. By Natl. Bd. of Fire Underwriters. May, Pp. 253-256.
How to Design Filter Block Underdrains. By Geo. S. Russell, Cons. Engr. May, Pp. 257-260.

The Surveyor (England)

Synthetic Detergents and Sewage Processing. April 21, Pp. 231-232.
Impressions of Sewage Treatment in the United States. By H. Fillingham Brown. April 28, Pp. 239-240.
Utilization of Organic Matter from Municipal Wastes. By L. P. Brunt. April 28, P. 241.

Aluminum Alloys

(Continued from page 41)

minum equipment is usually lower in first cost than similar equipment fabricated from other non-ferrous metals, from genuine wrought iron and from the stainless steels; and in the great majority of sewage plant atmospheres aluminum has an equal, if not greater, resistance to corrosion.

Aluminum alloys should not be considered as a cure-all for every problem with respect to sewage treatment plant equipment, nor should they be condemned because of a particular unsatisfactory application. Furthermore, it is important to understand that aluminum alloys are diverse in their properties and the successful use of the metal requires that the proper alloy be chosen. In some cases, an alclad aluminum alloy may be best for a sewage treatment plant application. This is especially true where the metal will be in direct contact with the sewage. Alclad products have a surface layer of aluminum or aluminum alloy which is anodic to the base alloy. By this means, protection is afforded not only by covering the base alloy but also by electrolytic action. Alloy selection, therefore, is fundamental to low maintenance and long life.

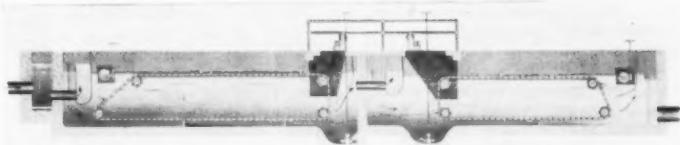
Table 1 shows the recommended aluminum alloys for some of the more common applications of aluminum in sewage treatment plants. For items requiring sheet or plate, both Alclad 3S-H14 and Alclad 4S-H34 are shown. Both alloys have excellent resistance to corrosion, and the choice should be based on the mechanical property requirements. Table 2 lists typical mechanical properties for some of the recommended aluminum alloys.

Are INDUSTRIAL WASTES Your Problem?

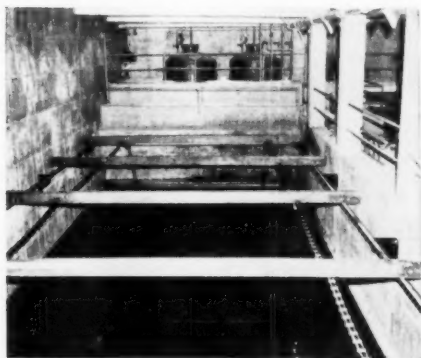
Let Link-Belt sanitary engineers show you how to recover valuable solids, protect public health, reduce stream pollution, and put waste treatment on an efficient basis. Link-Belt water and sewage treatment equipment is unexcelled in design and effective operation.



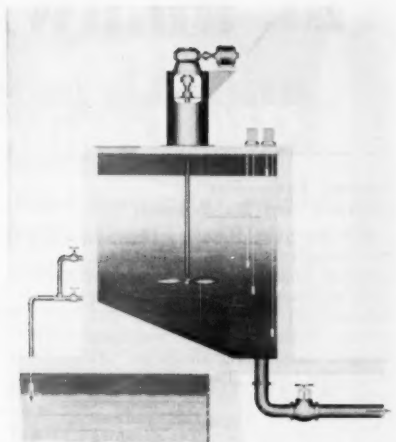
Above: To prevent stream pollution, and recover valuable carbon, with low moisture content, and practically no hand labor, Link-Belt flight conveyor in a specially designed tank gives excellent results. Can also be used for removal of mill scale from cooling water, etc.



Above: To separate waste oil and heavy solids from refinery waste waters, Link-Belt Straightline oil and sludge collectors in specially designed tanks, give high efficiency, and conform to A.P.I. recommendations.



Above: Many Link-Belt Straightline sludge and grease collectors in catch basins at meat packing houses have paid their costs several times in value of grease and solids recovered. Grease is collected on water surface and solids are pushed along the floor of tank. Solids may be processed for protein animal food and grease recovered by rendering.



Above: Neutralization is accomplished by mixing lime with acid wastes in the Link-Belt Flash Mixer, which can also be used to treat metal plating wastes or wherever a rapid and thorough mixing of liquids and chemicals is desired.

Link-Belt engineers have broad experience and a complete line of equipment—screens, sludge collectors, washers, mixers, dryers, aerators, power transmission and conveying machinery, with which to implement their recommendations.

LINK-BELT COMPANY

Philadelphia 40, Chicago 9, Indianapolis 6, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

11,812

LINK-BELT
Sanitary Engineering Equipment

THE HIGHWAY and Airport Digest

PUBLIC WORKS DIGESTS

Heating Pavements For Snow and Ice Removal

Michigan State Highway Dept. in 1948 installed, as an experiment, electrical heating elements in 500 lin. ft. of concrete and 500 of asphalt pavement on Highway M-102. The heating elements were standard sidewalk reinforcing mesh of 14-gauge iron wire. These were designed to operate on 50 watts per sq. ft. The drop along the roadway was 0.3 volt per foot. Temperature controllers turned current on when the pavement temperature fell to 36° and off when it rose to 38°. During the 1948-49 winter the system operated 505.63 hr. at an operating cost of \$663.43, an average of \$1.31 per hr. The snow fall that winter was only about one-third of normal.

George E. Marolf—"Heating Pavements for Snow and Ice Removal;" PUBLIC WORKS, May.

Bonding Improvement of Heavily Traveled Roads

The state-collected revenues from highway users—principally gasoline taxes and license fees—in 1947 averaged 0.5 ct per vehicle-mile for the entire country, reaching 0.9 ct in some states. Probably less than 10% of the primary federal-aid roads are in urgent need of improvement. At 4,000 vehicles daily and 0.6 ct per vehicle-mile such roads earn an average of \$24 per mile per day, or \$8,760 a year. Some roads average 40,000 vehicles a day, earning \$87,600 a year. Capitalizing at 5%, these earnings warrant issuing bonds for \$175,200 to \$1,752,000 per mile for immediate improvements, as a business proposition.

"Are Toll Roads the Only Answer;" *Engineering News-Record*, April 13.

Inclined Snow Fences

The normal method of erecting snow fences causes snow to accumulate to the leeward of the fence, to a distance from it roughly ten times its height. The Ontario Dept. of Highways conducted experiments with snow fence inclined at various angles and raised at various heights above the ground, the object being to induce the wind to blow snow

onto and across the road, blowing the snow from it. The conclusions reached were:

1. This method is definitely of value in certain locations, though it is by no means a cure-all.

2. Snow fence must be so installed that there is no possibility of its being plowed under by the normal snow-clearing operations.

3. The snow fence, if so erected as to take advantage of the prevailing wind, is a definite disadvantage in the case of the storm coming from a radically different direction.

No definite relationship appeared between the inclination of the fence and its effectiveness. Installations at the top-of-slope cuts appeared to give the best results.

C. Fraser—"Experiments with Elevated, Inclined Snow Fence on Ontario Roads;" *Roads and Construction*, April.

New Idea in Traffic Striping

The work preliminary to the painting of new stripes on roads offers an opportunity for the greatest reduction in cost and in hazard from those of the old method—"spotting" the line by hand at intervals along a rope stretched tightly between previously established points. The traffic striping crew of California Highway Dist. VIII has developed a plan for this purpose. A spray gun is mounted on the front bumper of a light express truck, with its nozzle about 3' above the pavement. The gun is actuated by a switch button on the steering post. A surveyor's transit is set up on an established point on the proposed line and sighted toward

another such point about a half mile away. The spotting truck is driven toward the transit, slightly weaving across the line, and the transit man indicates when the spray gun is just in line. A push of the button then marks the spot. The spots are placed at intervals of about 50 ft. An idea not yet worked out is to have the spotting gun actuated directly by the transit man by radio control.

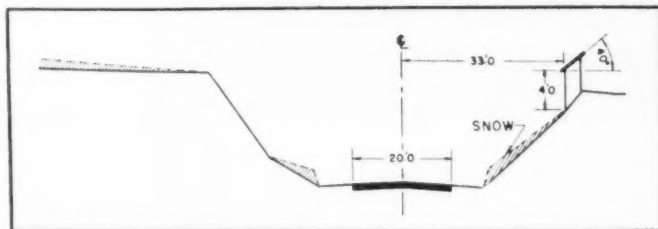
Don Wieman—"Traffic Striping: New Idea for Laying Out Highway Traffic Stripes;" *California Highways and Public Works*, April.

Continuous Reinforcement

In the fall of 1938 a considerable number of continuously reinforced sections, ranging from 20 to 1,310 feet in length, were constructed near Stilesville, Indiana, on U S 40 as a cooperative research project to study the effects of varying amounts of longitudinal steel in sections of various lengths.

The behavior of the sections during the first 10 years of service life conclusively shows that continuous reinforcement can be depended upon to prevent the opening of transverse cracks in concrete pavements. In the long, heavily reinforced sections many fine cracks have developed in the central region. These cracks have not opened and have raveled only slightly with traffic and exposure, a condition that has required no maintenance and may be considered superficial. The sections have remained strong, durable structural units.

The presence of even the heaviest longitudinal bar reinforcement has apparently not affected adversely



Courtesy Roads & Construction

● ARRANGEMENT of elevated inclined snow fence.



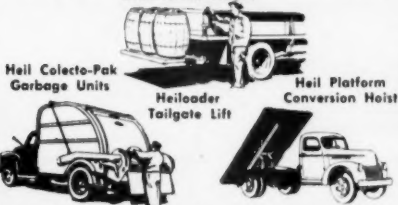
Heil offers a complete line of light-, medium-, and heavy-duty dump units for any truck chassis.

HEIL Bodies & Hoists

... stand up under plenty of punishment ... without down-time for repairs

Husky, reinforced body can't sag. You can count on long life, fast dumping, more trips. Heil design saves weight — permits bigger payloads.

See your **HEIL** distributor



Heil also makes a complete line of earthmoving equipment: Heiliners ... Dozers ... Scrapers ... Tamping Rollers ... Power Control-Units

BH-152A



Loading small stone at one of many State Highway depots in Ohio

**WRITE FOR
COMPLETE INFORMATION!**



JAW CRUSHERS • IMPACT BREAKERS
PULVERIZERS • CONVEYORS • LOADERS

EAGLE

CRUSHER CO., Inc. GALION OHIO-U.S.A.

MANY USES for this EAGLE TRUCK-MOUNTED LOADER

Think what it means to be able to load from stock-piles—any loose material, sand, cinders, gravel, etc.—at 3 to 5 yards per minute! Very effective in removing windrow snow. Get from job to job at truck speeds.

Hydraulic controls, chain crowd and many other features growing out of years of experience building loaders combine to make this Eagle Model 400 an exceptionally efficient and economical loader. One-man operation adds further to your saving.

the condition of the concrete in the pavement. The concrete appears to be sound throughout, there has been no spalling, and there is a complete absence of longitudinal cracking above the bars. In fact, the manner in which the steel has held closed all cracks, especially those in the more heavily reinforced sections, is believed to have been conducive to distributed interfacial pressure at the cracks which should tend to minimize damage to the concrete from concentrations of pressure such as sometimes develop at cracks in plain concrete pavements.

Pumping has developed at many of the transverse joints but, with two exceptions, has not been observed at any of the vast number of transverse cracks. This indicates that a concrete pavement without transverse joints and containing adequate longitudinal reinforcement is not nearly so susceptible to pumping as pavements of other designs.

In spite of the many transverse cracks that have developed in the long sections, the riding quality of the pavement has remained excellent and the pavement itself has

PUBLIC WORKS for June, 1950

been protected from damaging impact forces such as tend to develop where the surface alignment is not maintained.

The experimental pavement is a 9-7-9 thickened-edge type, 20 ft. wide. The longitudinal reinforcing bars used were 1", $\frac{3}{4}$ " $\frac{1}{2}$ " $\frac{3}{8}$ " and $\frac{1}{4}$ ", spaced 6" c to c. Transverse bars were $\frac{1}{2}$ " and $\frac{3}{8}$ " spaced 24" and $\frac{1}{4}$ " spaced 12".

Harry D. Cashell and Sanford W. Benham—"Continuous Reinforcement in Concrete Pavement;" *Public Roads*, April.

One-Lane Bridges

Should any county build one-way bridges? A questionnaire on the subject brought replies from a number of county and state highway officials. The general opinion was that, in agricultural areas, a narrow bridge causes trouble because of the width of farm machinery, regardless of the traffic count. There is danger of collision of head-on meeting cars. However, some counties are building them. Del Norte County, Calif., is now building a bridge 12 ft. wide and 200 ft. long on a road with a maximum traffic count of 20 cars a day. They also have one-way suspension bridges 10 ft. wide and 120 to 160 ft. long. States differ in their ideas of what width makes a bridge one-way. Kentucky considers a structure 18 ft. wide a one-way bridge. In Iowa, 16 ft. width is considered to provide a two-way crossing. In So. Dakota the minimum width for a one-lane structure is 14 ft., and for a two-lane traffic is 20 ft.; the latter costing 20% more than the former. Missouri also finds the increased cost is 20%, and designs one-lane bridges for roads having an average daily traffic count of 50 or fewer vehicles. Marion Co., Kansas says: "It makes no difference what the traffic count may be on a bridge; you cannot get a 20 or 24-ft. combine over a bridge with 14 ft. clear width."

"What About the One-Way Bridge?" *Better Roads*, April.

A One-Man Concrete Paver

During the past two years, engineers of the Iowa Highway Commission, have developed a machine which combines the operations normally performed by a spreader, transverse finishing machine and longitudinal float. It uses ready-mixed concrete; is operated by one man. It lays a 10 ft. lane of 6" con-

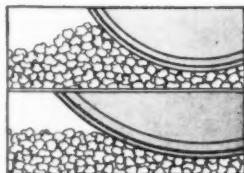
TRENCH ROLLER



Better 3 Ways

1--Higher, Heavier Compression Roll

Slightly exaggerated drawing illustrates how smaller diameter roll tends to push material ahead while larger roll exerts greater downward compression. Net result—few wavy spots, less reworking.



2--Improved, Hydraulic-controlled Leveling Wheel—(with pneumatic tire)

keeps machine on even keel regardless of trench depth. A3" hydraulic cylinder easily raises or lowers wheel to desired height. Here again, the pneumatic-tired wheel facilitates loading on highway trailer—makes transporting safer.

3--"Out-Of-Trench" Steering Wheel

Keeping steering wheel on the old pavement instead of in trench greatly improves control and performance. Much easier to get roller out of trench.



Send for free full line folder.

ALL PURPOSE SPREADER CO. Elyria, Ohio U.S.A.

When writing, we will appreciate your mentioning PUBLIC WORKS

crete at rates up to 10 ft. per min. Runners on the sides act as forms. The key to the entire operation is in vibrating the concrete. It is believed that it is practicable to lay a 22 ft. or wider lane at one pass, and install reinforcement.

"One Man Paver Developed for Placing Concrete Without Forms," *Roads and Streets*, April.

BIBLIOGRAPHY

Better Roads

What About the One-Way Bridge? A forum discussion. April, Pp. 23-25.
Bituminous Resurfacing. A forum discussion. April, P. 25.
Will Toll Roads Ease Highway Financing Difficulties? By *Henry K. Evans*, Highway Transportation Specialist. April, Pp. 26-29.
Countries Share in Retirement Plan. By *John E. Fletcher*, Washington State Employees' Retirement System. April, Pp. 35-36.

California Highways

A New Idea for Traffic Striping. By *Don Wieman*, Highway Supt. April, Pp. 4, 52.
Truck-Trailer Paths on Short Radius Turns. By *J. C. Young*, Traffic Engr., Div. of H'ways. April, Pp. 14-31.
Erosion Control. By *H. Dana Bowers*, Supervising Landscape Architect. April, Pp. 34-41, 59.

Civil Engineering

Careful Design Cuts Construction Costs on Los Angeles Freeway Structures. By *L. C. Holster*, Bridge Engr., Calif. Div. of H'ways. May, Pp. 42-46.

Engineering News-Record

Are Toll Roads the Only Answer? By *L. L. Hervez*, B.P.R. April 13, Pp. 42-43.
Care in Distributing Hot Mix Speeds Highway Widening. By *Horace S. Kerr*, Contractor. April 20, P. 41.
Grading Job Overruns 1500 Percent. By *C. R. Hanes*, Field Engr., Ohio H'way Dept. April 27, Pp. 43-44.
Cheap Repairs for Damaged Bridges. By *Ray Bloomberg*. May 4, Pp. 32-33.

Public Works

Heating Pavements for Snow and Ice Removal. May, Pp. 42-43.
How Equipment Is Used Effectively in County Highway Work. May, Pp. 48-49.

Roads and Construction

Developing a Low-Cost Compaction Method for Road Construction. By *W. E. Wintory*, Engr. Saskatchewan Dept. of H'ways. April, Pp. 80-84, 129.
Concrete Pavement Design Offers Many Advantages. By *C. E. Cobb*. April, Pp. 85, 117.
Asphalt Mixture Design and Control. By *Roland Fokke*, Asphalt Technologist. April, Pp. 86-87, 120.
Experiments with Elevated, Inclined Snow Fence on Ontario Roads. By *C. Fraser*, Div. Engr. Dept. of H'ways. April, Pp. 88-90, 113.
Factors that Reduce Road Capacity and How to Correct Them. By *O. K. Normann* and *W. P. Walker*, U. S. B. P. R. April, Pp. 91-96, 102.

Roads and Streets

One-Man Paver Places Concrete Without Forms. April, Pp. 52-53.
Triaxial Testing: Application to Highway Materials. By *Chester McDonnell*, Sr. Soils Engr., Texas H'way Dept. April, Pp. 59-65.
Low-Cost Airport for a Small Southern Community. April, Pp. 79-81, 89.
Road Modernization in Texas. By *Horace S. Kerr*, Contractor's Supt. April, Pp. 83, 85, 87-89.
Design of Seal Coats and Surface Treatments. By *F. N. Hicem*, *W. H. Lowery* and *G. B. Sherman*, Engrs., Calif. Div. of H'ways. April, Pp. 91, 93, 95-100.

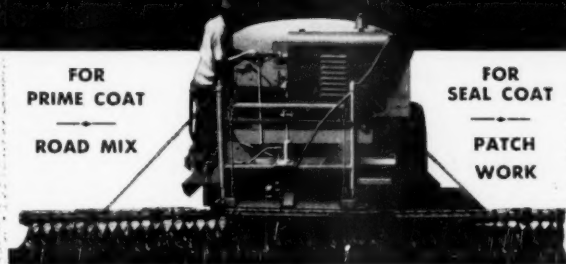
Grid Roller Reduces Pavement Salvage Costs

For salvaging a 10-year old road-mix pavement, a Hyster grid roller, a power grader and a Caterpillar 35 tractor were used. The pavement was first sacrificed with the tractor or grader pulling the roller; several further passes were then made to break up the material; the grader windrowed the pulverized material to one side of the road; the subgrade was compacted; the windrow spread back over the base with the blade grader; and this was

compacted with the roller. The surface was then placed and finished with a smooth roller. One man salvaged up to a mile of the road per day, full width.

On a 16-year old road mix pavement was first sacrificed with the cleaner and a 1-ton counterweight, hauled by a No. 12 Caterpillar motor grader, pulverized 77,088 sq. yds. of surface at a cost of 2 cents per sq. yd. Due to the complete breaking up of the old surfacing, the amount of oil required per sq. yd. for retreatment was reduced from 1 gal. to 0.75 gal.

STANDARD STEEL PRESSURE DISTRIBUTOR



**FULL CIRCULATING SPRAY BAR
GIVES UNIFORM SPREAD OF MATERIAL
THROUGHOUT LENGTH OF BAR...**

SIMPLIFIED PIPING PERMITS FAST LOADING AND LAYING...

✓ 25% More Asphalt shot per day! Faster loading! No delays Starting! Instant cleaning at end of run! These are facts known to every operator of **Standard Steel Pressure Distributors!** Why? Because of the simplified piping in this equipment! The full circulating spray bar contains submerged valves which are quickly heated and remain uniformly hot at each point of pouring. The throw of a single lever opens and closes all valves instantly. Every inch of the spray bar delivers precisely the same material output—lightest or heaviest bituminous material. And there are 12 other special features that make this equipment outstanding in performance. Write for catalog 424 today for complete details.

OTHER PRODUCTS

Maintenance Distributors, Tor
Kettles, Patch Rollers, Supply
Tanks, Tool Heaters, Asphalt
Tools, Street Flushers, Construction
Brooms.

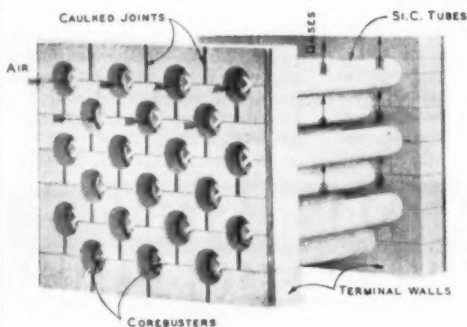


PD3

Standard Steel Works, NORTH KANSAS CITY, MO.

first step to a better incinerator...

FITCH AIR HEATERS



Fitch Recuperators (air heaters), by providing for the individual replacement of tubes when necessary, have an indefinitely longer life than the average heater. Bulletin No. 11 explains why. Address:

FITCH RECUPERATOR COMPANY
PLAINFIELD, N. J.

HAUCK Presents

ASPHALT PAVING TOOL HEATERS



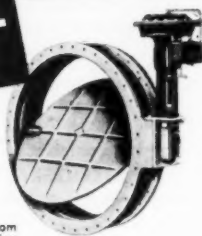
Combination Tool and Cement Heater for bituminous pavement construction and repair work. Heats 16 or more tools in 5 minutes. Hot asphalt cement 10 minutes after starting. No waiting. No smoke or sparks. Rugged, insulated tool heating chamber on pneumatic, solid rubber or steel tires; 60-gal. binder cement kettle; fuel tank and 3 torch type oil burners.

HAUCK MFG. CO.
117-127 Tenth St., Brooklyn 15, N. Y.



Get Easy Control . . Quick Shut - Off
of Air • Gas • Steam • Liquids • Solids

ROCKWELL VALVES



for

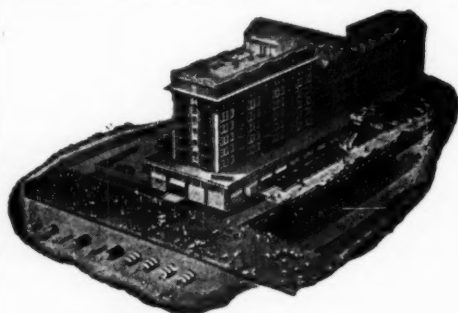
- Controlling flow from secondary settling tanks.
- Recirculation in bio-filter plants.
- Low pressure water.
- Handling effluent from primary tanks.
- Controlling flow in water or sewage treatment or sludge.
- Handling lake or river water.
- Control of air supply to boilers, furnaces, reactors.

Rockwell Valves are rugged, compact; give full flow area, with minimum pressure drop; provide excellent commercial tightness; easy to clean. Made of any suitable metal or rubber-covered for pressures to 60 p.s.i. Equipped with any type manual control or motor, hydraulic, air diaphragm or float type automatic control. Slide Valves available in pipe sizes to 24"; Butterfly Valves in sizes from 1" to 84".

Write for our
Valve Catalog



W. S. ROCKWELL COMPANY
252 ELIOT STREET, FAIRFIELD, CONN.



Hotel Strand

Atlantic City's
Ideal Convention Hotel

Exceptional Convention Facilities adaptable to small, medium or large groups. Ample Meeting, Banquet and Exhibition Rooms. Wonderful location on Boardwalk opposite Steel Pier, the center of Atlantic City. Write Convention Manager TODAY.

The Strand features Spacious Colorful Lounges—Open and Inclosed Solaria—Salt Water Baths in Rooms—Garage on premises. Courteous Personnel.

When in Atlantic City visit
FAMOUS FIESTA LOUNGE

"Food for Epicures"

Exclusive Penna. Avenue and Boardwalk

Effects of DDT on Persons

A study has been reported by the Navy of the effect of DDT on persons who have been in prolonged environmental contact with this insecticide during malaria, insect pest and rodent control operations at established bases.

Because of the active participation of military personnel in preventive medicine programs on overseas bases and in the continental United States, a preliminary study was conducted by the investigators on a long series of laborers presenting unusual and prolonged environmental contact with DDT. A special effort was made to obtain the cooperation of those persons who presented histories of lengthy contact without regards to medical examination as the primary method of separation. Selected individuals most likely to demonstrate DDT concentrations in fat depots of the body were taken from experienced malaria, pest, and rodent control personnel. Their chief occupations consisted of compounding and mixing DDT-oil formulations, the dissemination of these solutions by means

of the DDT-fog generator, the application of larvicides and adulticides by means of knapsack and power sprayers or the distribution of DDT dusts by hand-operated dusters in routine pest control operations.

This study represents the first effort chemically to detect DDT in biopsied fat from apparently healthy human subjects. In addition to tissue examination, 24-hour urine samples, feces and whole and citrated blood were obtained for chemical analyses. In the first series recently completed, no DDT was detected in the material under study from 16 individuals detailing histories of exposure by contact for periods varying from 6 months to 3 years; one subject presented a history of daily contact for a period of 5 years.

These negative results obtained from human volunteers are considered to be important and significant. Because DDT is preferentially contained in fat, its presence represents actual storage rather than passive or temporary flooding of organs of fatty tissues. The authors are led to conclude, therefore, that, (a)

handlers utilizing normal precautionary measures not only fail to exhibit symptoms of DDT poisoning, but, (b) show no chemically detectable accumulation of DDT in body fat as a result of prolonged external contact with this agent. It likewise indicates that malaria control operators can safely utilize the services of personnel over long periods of time without fear of developing toxic tissue levels of DDT.

Military personnel and their dependents exposed to DDT in areas where nightly fog applications are made have not exhibited any untoward reactions to oil fog or DDT proper. In many instances these subjects have been residents of endemic fog areas for 3 years or longer. It is felt that the cross-section of population represented on 3 large Marine Corps bases provided an adequate sample from which the epidemiologic and clinical observations were made.

Adequate personnel protection, adherence to recommendations for use, and the careful indoctrination and rotation of exposed individuals through varied duties within the organization have been in part responsible for the small number of toxicities known to date.

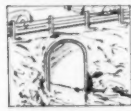
UNIVERSAL Flat-base pipe

FOR SAFETY, UTILITY, ECONOMY, SPEEDY CONSTRUCTION

CATTLE PASS . . . special size flat-base pipe is wide enough for cow-with-calf, narrow enough to prevent jamming. Lay under new fills or jack through old construction. Makes railroads, streets and highways safe; protects livestock. Inside measurements—48" x 72", other flat-base pipe sizes—46" x 46" to 97" x 97".



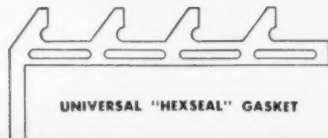
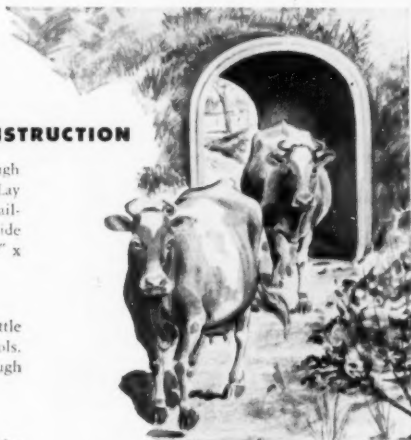
PEDESTRIAN UNDERPASS . . . very similar to the cattle pass in construction and use. Especially valuable near schools. Investigate the cost-slashing shortcuts available to you through use of Universal flat-base pipe for these and other uses.



CULVERTS . . . pre-cast, reinforced flat-base pipe simplifies culvert construction, gives a sturdy, long-lasting job.



UTILITY GALLERIES . . . large-size flat-base pipe carries gas mains and electrical cable with ample room for workmen to make repairs and additional installations.



UNIVERSAL "HEXSEAL" GASKET

UNIVERSAL CONCRETE PIPE CO.

Home Office: 297 S. High St. Columbus, O.

Universal plants in: Decatur & Dothan, Ala.; Tampa & Ocala, Fla.; Atlanta, Ga.; Kenil, N. J.; Binghamton, Port Washington, Rochester & Syracuse, N. Y.; Columbus & Zanesville, O.; Norristown & Pittsburgh, Pa.; Nashville, Tenn.; Clarksburg & New Martinsville, W. Va.

THE WATER WORKS DIGEST

PUBLIC WORKS DIGESTS

Fire Protection For Logan Airport

Logan Airport covers an area of about 2,000 acres. While some water is needed for domestic consumption, by far the largest demand is for fire protection. Based on the recommendations of the New England Fire Insurance Rating Ass'n, it was thought necessary to provide for a demand of 15,000 gpm. A sufficient amount of water could be obtained from the Boston Metropolitan system, but the mains of that system were not large enough to deliver it at that rate. Sea water was available in unlimited amount, but it was not considered advisable to use it.

The author says that of the several salt water supplies along the New England coast, he knows of four systems that have been abandoned: the high-pressure fire system in Boston; the fire-supply mains at the Navy Fuel Depot, East Boston; the fire-supply mains at the Navy Shipyard in Hingham, and the fire-supply mains at the Quonset Point Naval Air Station, Rhode Island. The latter three installations were converted to fresh-water systems, but in Boston the mains were entirely abandoned.

The principal reasons for the abandonment of these salt-water systems were that the suction intakes foul up very rapidly with marine growths; the mains, valves and fittings rust and corrode more rapidly, and, in the case of Boston, it was found that in many instances the salt water did more damage to the merchandise and equipment in buildings than the fire itself.

The plan adopted was to bring a 36" supply main from the Metropolitan system and a 24" main from the Boston distribution system, and to provide three 750,000-gal. steel storage reservoirs and a pumping plant to draw the fire supply from them. The tanks will be set about a foot above grade; tanks elevated sufficiently to give direct pressure were not considered permissible by the aeronautics authorities. The pumping plant will contain 5 electric motor-driven turbine pumps with a rated capacity of 2,600 gpm, and two 3,200 gpm centrifugal pumps with dual electric gasoline-engine drive. The Boston Edison Co. will erect

two unit substations at the airport, and by means of an interconnection feature the pumps can draw power from either of these.

George W. Coffin—"Water Supply for the Logan Airport;" *Journal, New England Water Works Ass'n*, March.

Use of Chlorine Dioxide

Chlorine dioxide was in use by well over 100 municipal water supplies in 1949. It serves a number of purposes. It handles taste and odor problems due to phenolic and other industrial wastes, sewage, algae and decomposed vegetation. It aids in maintaining an active chlorine residual in the distribution system. Its bactericidal properties are equal to or better than chlorine against numerous organisms. It is easy to use and does not require special laboratory control.

R. N. Aston—"Progress Report on Chlorine Dioxide;" *Journal, New England Water Works Ass'n*, March.

Electric Analyzer For Pipeline Networks

The author describes a direct electrical-analogy method of pipeline network analysis which eliminates all calculations beyond a simple change of scale. It may be used either to evaluate flows and head losses for all pipelines in a network, or to determine, from a single measurement, the value of total head loss between any two points in the network. It is rapid and flexible and permits comparisons

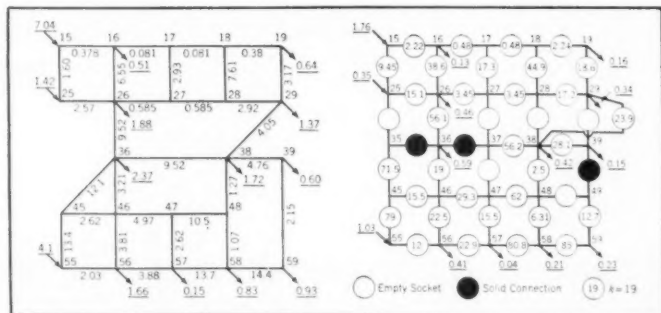
of performance to be made easily among alternate plans proposed for extensions to or improvements in the pipeline network and its source of supply.

Each pipe line is represented by a special nonlinear resistor, instead of a linear resistor as in previous methods. Each nonlinear resistor consists of a tungsten filament mounted in an evacuated glass bulb. The voltage across this filament varies with the current through it, as friction head loss varies with flow rate in the pipe line it represents. A set of these resistors is interconnected according to the plan of the pipe-line network. The brightness of the incandescent filaments indicates which have the largest head losses. The values of head losses and flow rates are read directly from special scales.

Malcolm S. Mellroy—"Direct-Reading Electric Analyzer for Pipeline Networks;" *Journal, American Water Works Ass'n*, April.

Water Hammer In Los Angeles

The water distribution system of Los Angeles is divided into several pressure zones varying in elevation from zero to 1719 ft. above sea level. They are separated by 104 pressure regulators which vary from one 2" to three 12". Both globe type and plug type valves are used for regulating pressure, controlled by pilot valves. If a pressure regulator should stay open for any reason, high-pressure water would enter a low-pressure zone, and a pressure-



Courtesy Journal AWWA

● ANALYZING pipe networks by electricity.

4 good reasons why Permutit is WATER CONDITIONING HEADQUARTERS

1. Precipitation

The Permutit® Precipitator offers a most efficient means of removing water impurities. Operating by precipitation, adsorption, settling, and upward filtration, it can save you up to 50% in space, 40% in chemicals, and 75% in treatment time. Applications include softening; removal of turbidity, color, taste, odor, alkalinity, silica, fluorides.

2. Water Softening

The ion exchange (zeolite) process for softening or demineralizing water—recognized as the simplest method—was originated by Permutit. Present-day equipment includes fully automatic units with simplified controls, and manually controlled multi-port valves, both giving improved performance. Permutit can furnish the correct ion exchanger for any requirements.

3. Iron Removal

Pulp, paper and textile mills, chemical plants, tanneries and other industries requiring water low in iron content depend on Permutit equipment. Permutit processes for iron removal include base exchange; oxidation by manganese zeolites; aeration, settling and filtration; and other processes to meet any specific requirement.

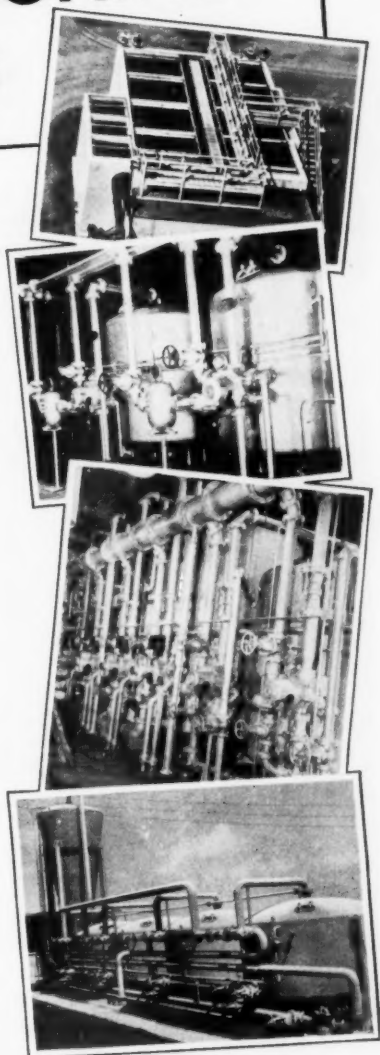
4. Cold lime-soda Treatment

The new Permutit Spiractor® requires far less space and treatment time than earlier types of lime-soda equipment. In the Spiractor, the precipitates accumulate on solid nuclei to form large, heavy granules that can be separated from the water at relatively high flow rates. No sludge is formed; the granules can be disposed of easily.

For full information about these or any other water conditioning processes, write to The Permutit Company, Dept. PW6, 330 West 42nd Street, New York 18, N. Y., or to Permutit Company of Canada, Ltd., Montreal.

Permutit

Water Conditioning
Headquarters
For Over 37 Years



relief valve is located on the low side of each regulator, within a few feet of it, discharging into a storm drain inlet if possible. To prevent the surge caused by a regulator from reaching the pilot valve, a new type of surge suppressor is used, in which the energy of the wave is absorbed in compressing air in a rubber and steel chamber.

To prevent water hammer caused by closing gates, crews are trained to close the last 25% slowly. It is desirable to have a pressure gauge connected upstream from a large valve to warn of too great a rise in pressure. With a pressure of 40 psi

in the highest part of a hilly zone, it may be 200 psi in the lowest part, and many consumers use individual pressure regulators. Should the seats of these become worn, they may cause water hammer reaching 100 psi.

Alexander C. Renner—"Los Angeles, Experience with Water Hammer;" *Journal, American Water Works Ass'n*, April.

Asphalt in Hydraulic Works

The author advocates the use of asphaltic concrete for lining and facing reservoirs, canals, dams and

storm channels. He does not advise the general use of other kinds of asphalt linings such as sprayed membranes, surface treatments or mixed-in-place types. Los Angeles, Calif., is lining a reservoir with nearly 1,000,000 sq. ft. of asphaltic concrete, and Brawley, Calif., is placing more than 500,000 sq. ft. Long experience has demonstrated that, where weed growth is to be expected, 40-60 penetration asphalt should be used. For other conditions, 85-100 penetration grade is recommended. It is found that properly compacted mixtures are impervious to the passage of water if the asphalt content is 6½% or more. Experience indicates that such linings can be expected to have a service life far in excess of 25 yr. The cost for this type of work in Southern California has averaged very close to 13 c. per sq. ft. for 3" linings.

J. M. Lackey—"The Use of Asphalt in Hydraulic Work;" *Journal, American Water Works Ass'n*, April.

Use of Anthrafil

Anthrafil as now furnished weighs about 53 lb. per cu. ft. Losses due to attrition in filters amount to 0.2% per year. Being pure carbon it has no chemical reaction with either acid or alkaline water. Tests have shown that .60-.80 mm anthracite as a filter medium can produce good quality effluent at considerably higher rates, with longer runs and less wash water, than is possible with comparable sizes of sand; and that larger sizes and higher rates are practicable. Users of anthrafil have reported as advantages, saving in wash water, cleaner filters, longer runs, and less time out for washing. Some report more loss of filter medium than in sand filters, but this probably can be prevented by more care in washing.

J. A. Oldenburg—"How Anthrafil Is Used in Water Filtration;" *PUBLIC WORKS*, May.

Effect on Bacteria of Partial Demineralization

(An interesting feature of this paper is that the authors are connected with the Weizmann Inst. of Science, located in the newest country—Israel.)

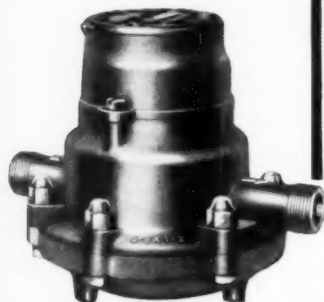
In the course of a project to devise and test economic methods of demineralizing brackish waters, the question of the bacteriological purity of the treated water arose and a study was made, resulting in the following conclusions:

1. Bacteriological examination of

*"I'm one of 2000
Waterworks Superintendents
saving money through
the SIMPLICITY of
Buffalo-Made
Meters."*

Water systems in cities, towns and villages throughout the nation are saving money and increasing their revenue through the use of Buffalo AMERICAN Meters. Maintenance costs reflect the simplicity and absence of unnecessary parts, so Buffalo Meters provide full meter earnings at lowest cost per thousand gallons.

AMERICAN (Bronze Case) WATER METERS
NIAGARA (Galv. Iron Case) WATER METERS



BUFFALO METER CO.

2920 MAIN STREET, BUFFALO 14, N. Y.

When writing, we will appreciate your mentioning PUBLIC WORKS

samples from a pilot plant for partial demineralization of brackish waters showed that the cation-exchange effluent was free of bacteria, while the anion-exchange effluent was heavily contaminated.

2. Laboratory experiments using sterilized apparatus showed that partial demineralization of a soft, brackish water, with about 2,000 ppm. dissolved solids, containing about 1,000 *Esch. coli* per milliliter, caused complete destruction of the bacteria at the beginning of the run, and, when the resins neared exhaustion, less than 10 and 100 bacteria per milliliter were found in the cation and anion exchanger effluents, respectively.

K. S. Spiegler and Esther Hellinger—"Effect of Partial Demineralization of Water on Bacteria," *Journal, American Water Works Ass'n*, April.

Metallizing to Combat Corrosion

Sprayed zinc and aluminum coatings stand up much longer than galvanized or paint coatings, chiefly because much heavier coatings can be applied. They give electrochemical as well as physical protection. They provide surface pores which are a better base for paint than a sandblasted surface. They are lower in cost per year of service life. They cost a minimum of 50 ct. a sq. ft. for 0.01" thickness, but last at least 25 yr.; giving an annual cost of 2 or 3 ct. per sq. ft. per yr.

Coating should be preceded by sand blasting with hard, sharp, angular silica or flint sand. If the surface is to be immersed in water, about .0015" of low-carbon steel should be applied as a pre-coat. Electrical thickness gauges measure the thickness or non-magnetic coatings. For underground pipes in acid soil, aluminum is preferable; zinc is better for slightly alkaline conditions.

John E. Wakefield—"Metallizing—A Waterworks Maintenance Tool," *American City*, May.

A New Method of Prestressing Water Tanks

The first use of this method was in constructing, at Monterey Park, Calif., a million-gallon reservoir of 90 ft. diameter, 27 ft. high. The walls are 10" thick at the bottom and 5" at the top, composed entirely of gunite, reinforced with $\frac{5}{8}$ " round bars and 4" x 4" No. 8 wire mesh. An outside form was erected, the reinforcing placed, and gunite was shot against the form in layers, ending with a thin layer using screened

plaster sand finished with a steel float. After 3 days the forms were stripped, the outer surface sand-blasted, and 48 tension rods placed around the tank in rings spaced at intervals varying from 2" at the bottom to 16" at the top of the wall. These tension rods were made of 1" round deformed reinforcing bars furnished in 60 ft. lengths, electric arc-welded at laps. To produce the prestressing, each bar was pryed outward from the wall until under a stress of 25,000 psi, when a steel wedge was dropped between the bar and the wall. This was repeated at 4-ft. intervals throughout the length

of each hoop. When this had been completed, the tank was filled with water and kept full for 30 days. No leaks developed. The outside was then covered with gunite giving a minimum thickness of 1½" over the rods.

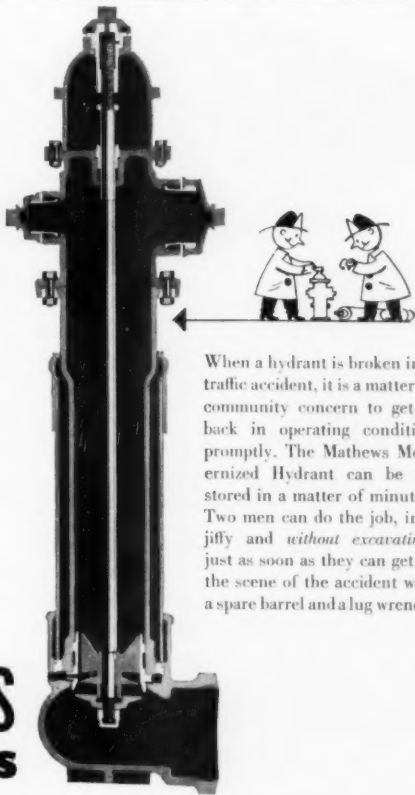
Don Hull McCreery—"Monterey Park Reservoir Introduces New Method of Prestressing Concrete," *American City*, May.

Fire Protection For New Districts

If the existing distribution system is inadequate to supply water for fire protection at sufficiently high

**SPEED OF
REPLACEMENT
MEANS SAFETY
FOR THE
COMMUNITY**

**MATHEWS
HYDRANTS**



When a hydrant is broken in a traffic accident, it is a matter of community concern to get it back in operating condition promptly. The Mathews Modernized Hydrant can be restored in a matter of minutes! Two men can do the job, in a jiffy and without excavating, just as soon as they can get to the scene of the accident with a spare barrel and a lug wrench.

Made by R. D. Wood Company

Public Ledger Building, Independence Square
Philadelphia 5, Pa.

Manufacturers of "Sand-Spun" Pipe (centrifugally cast in sand molds) and R. D. Wood Gate Valves.

Mathews Modernized Hydrants Set the Pace Easily maintained because simple in construction • All working parts contained in the replaceable barrel • Stuffing box cast integral with nozzle section • Head can be turned 360° • Replaceable head • Nozzle sections easily changed • Nozzle levels raised or lowered without excavating • Protection case of "Sand-Spun" cast iron for extra strength, toughness, elasticity • Operating thread only part to be lubricated • A modern barrel makes an old Mathews good as new

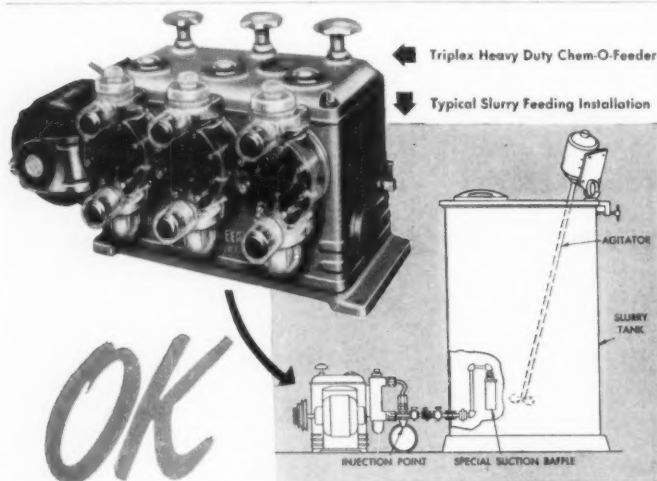


THE FIREMAN'S FRIEND

When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.

rates in a new district, it is necessary either to strengthen the existing system by installing additional main capacity or to provide storage connected to the system by a main not smaller than 12". The storage may be in elevated tanks, or in ground reservoirs with pumps delivering into the distribution system. The latter proves satisfactory, with at least two pumps with reliable power supply. If the new district is at such an elevation that the existing system can not furnish satisfactory pressure, a high service supply is practically always pro-

vided by pumping from the existing system; the pumping station being located at a storage reservoir or elevated tank if there is one on the low service available. Elevated storage should be provided on all high services supplied by pumping stations, as this provides a supply for fire protection, more uniform pressures and pumping rates, and a cushion against surges. Instead of a high-service pumping station drawing from low-service storage, if there is no such storage booster pumps will be used taking suction directly from the low-service mains.



For FEEDING SLURRIES Against Pressure!

- LIME SLURRY FOR pH CORRECTION
- ACTIVATED CARBON SLURRY FOR TASTE AND ODOR CONTROL
- DIATOMACEOUS EARTH SLURRY FOR FILTRATION
- CALCIUM CARBONATE SLURRY FOR WATER CONDITIONING

% Proportioners % new Heavy Duty Chem-O-Feeder solves a difficult feeding problem — it's ideal for feeding abrasive slurries against pressure — positively, accurately — without wearing out pump parts. For handling slurries the Chem-O-Feeder has semi-knife edge check valves of stainless steel or silver, with a diaphragm of whipcord-reinforced soft rubber.

The feeding rate can be adjusted with extreme accuracy by merely turning a knob, without stopping

the Chem-O-Feeder. A magnifying register glass shows exact reading of stroke length in increments of .001". The plastic See-Thru reagent heads, convenient oil fill, and automatic lubrication reduce maintenance to a minimum. Chem-O-Feeders are available in Simplex, Duplex and Triplex Models to feed up to 8 g.p.h. per unit at pressures to 125 psi. Can be furnished with one or more slurry feeding heads, with other heads feeding different water treating chemicals. Write for information.

% PROPORTIONERS, INC. %

356 HARRIS AVE. PROVIDENCE 1, R. I.

When writing, we will appreciate your mentioning PUBLIC WORKS

PUBLIC WORKS for June, 1950

These usually are not large enough to supply the water to the pumps at the necessary rate and a new main or mains is necessary. In some small booster stations there are separate pumps for domestic and for fire use, since the demands of the two differ widely.

Kenneth J. Carl—"Water Supply for Fire Protection in Growing Municipalities," *Journal, American Water Works Ass'n*, April.

BIBLIOGRAPHY

American City

Philadelphia Builds 215-mgd Pumping Station. By H. G. Werner, Design Engr., Bur. of Water. May, Pp. 95-97.
Metalizing—A Waterworks Maintenance Tool. By John E. Wakefield. May, Pp. 102-104.
Monterey Park Reservoir Introduces New Method of Prestressing Concrete. By Don Hall McCrory. Pres. Quinton Engrs. May, Pp. 116-118.

American Journal of Public Health

Effect of Free and Combined Available Residual Chlorine Upon Bacteria in Swimming Pools. By Eric W. Mood. Dir. Bureau of Environmental Sanitation, New Haven, Conn. April, Pp. 459-466.

American Water Works Ass'n Journal

Rates for General Water Service. By Orville P. Denel, Wisconsin Public Service Com'n. April, Pp. 327-332.
Fire Protection Service Charges. By Preston A. Reynolds and George K. Hood, public accountants. April, Pp. 333-340.
Water Supply for Fire Protection in Growing Municipalities. By Kenneth J. Carl, Engr., Nat'l Bd. of Fire Underwriters. April, Pp. 341-346.
Direct-Reading Electric Analyzer for Pipeline Networks. By Malcolm S. McIlroy, Prof. of Elec. Eng., Cornell Univ. April, Pp. 347-366.
Benefited Water District Plan for Main Extensions. By Dale L. Maflitt, Gen. Mgr. Des Moines water works. April, Pp. 367-369.
Los Angeles Experience with Water Hammer. By Alexander C. Renner. April, Pp. 370-374.
Aspects of Competent Purchasing. By H. R. LaFortune, Mgr. Purchases & Stores, Sacramento Mun. Utility Dist. April, Pp. 375-380.
The California Water Plan. By William L. Berry, Sr. Hydr. Engr., Dept. of Pub. Wks., Sacramento, Calif. April, Pp. 381-385.
Tennessee Rate Changes Since 1947. By Charles L. Crangle, Director of State Planning, Tennessee. April, Pp. 386-390.
Elements in the Rate Structure. By Merrill L. West, Chf. Operator, Water Purif., Kingsport, Tenn. April, Pp. 391-394.
Costs of Water Softening. By Russell S. Banks, Local Mgr. Ohio Water Service Co. April, Pp. 395-400.
The Use of Asphalt in Hydraulic Works. By J. M. Lackey, Dist. Engr., Asphalt Institute. April, Pp. 401-408.
Effect of Partial Demineralization of Water on Bacteria. By K. S. Spiegler and Esther Hellinger, Daniel Sieff Research Institute, Israel. April, Pp. 409-412.
A New Method for Determining Methane in Water. By J. R. Rossum, P. A. Villaruz, and J. A. Wade, Jr., Engrs., California Water Service Co. April, Pp. 413-415.
The Present Status of Public Water Systems in Florida. By John T. Telfair, Jr., San. Engr., Florida Bd. of Health. April, Pp. 416-420.

Civil Engineering

Los Angeles Considers Reclaiming Sewage Water to Recharge Underground Basins. By Harold E. Hedner, Chf. Engr., Los Angeles Co. Flood Control Dist. May, Pp. 39-40.
Blending of Sewage Effluent With Natural Waters Permits Reuse. By A. M. Razon, Chf. Engr., Los Angeles Co. San. Dist. May, Pp. 40-41, 89.

Engineering News-Record

The Filter's Operating Story. April 13, Pp. 34-35.
Machine Lining Applied to Large Pipe. May 4, Pp. 41-42.

Public Works

Water Works, Today and Yesterday. May, Pp. 33-38.
 Aquatic Biology and the Waterworks Engineer. By James H. Lackey. May, Pp. 39-41, 64.
 Chicago Water Department Installs Radiotelephone. May, P. 47.
 How Anthracite Is Used in Water Filtration. By J. A. Oldenburg, Sec. Palmer Filter Equipment Corp. May, Pp. 50-52, 76.

Taste and Odor Control

Progress in Carbon Slurry Handling at Chicago, Ill. By John R. Baylie, Engr. of Water Purification. March, Pp. 1-10.

Technique Sanitaire et Municipale (France)

La Sterilisation des Eaux par de Chlore et l'Ozone. By R. Lervet, M. Des Vallieres, Cyril Gomella and J. Bonchard. March, Pp. 46-58.

Water Works Engineering

Water Supply of Salt Lake City. By H. C. Hague, Asst. Supt., Dept. of Water Supply. April, Pp. 290-293, 318.
 Inexpensive Relays Can Be Used to Alternate Electric Pumps. By Frank E. Reeves, Sr. Elect. Consult. Engr. April, P. 299.

Safety for Center-Lining Crews

The North Carolina State Highway and Public Works Commission specifications for the protection of center-lining crews were published in a recent issue of the National Safety Council News Letter. These specifications cover the following sound practices:

1. Each centerline crew should have the front first and rear last vehicle equipped with an 8-inch red blinker. These lights should be near the center of the vehicle and mounted high.
2. The front and rear vehicles of the painting operation should each be equipped with a sign bordered by 45 degree cross-hatched stripes. (If only one vehicle is used, it should carry a sign at each end.) These signs should be mounted high on the vehicle and be 5 feet x 2½ feet with the message "Keep right" and an arrow and skull and crossbones.
3. All vehicles used in the painting operation should have red flags displayed conspicuously.
4. It is desirable to have a flagman both in front and at the rear of the painting operation.
5. When a very small paint machine is used and is operated by one man, it should be led and followed by other vehicles with the proper warnings displayed.
6. Large signs (6 feet x 4½ feet) should be placed on each side of the painting work, well in advance. They should be moved frequently enough that they will not be more than two miles from the painting equipment.
7. If the paint capacity of the equipment is small and frequent filling is necessary, it is advisable to have a fire extinguisher along with the unit.

8. The practice of placing cans on the road to protect a wet line should be discontinued, as should the practice of placing wood blocks for this protection. Instead, it is recommended that some protective device be used which is made of rubber or pliable plastic material. Several such devices are available in the shape of tall cones or Z-bars.

Signs 24-inch x 24-inch should be placed periodically on center lines with the necessary messages, such as "Slow to 30 mph," "Wet Paint," and on or near the paint machine, "Drive on Shoulder."

Safety Benefits in Bangor

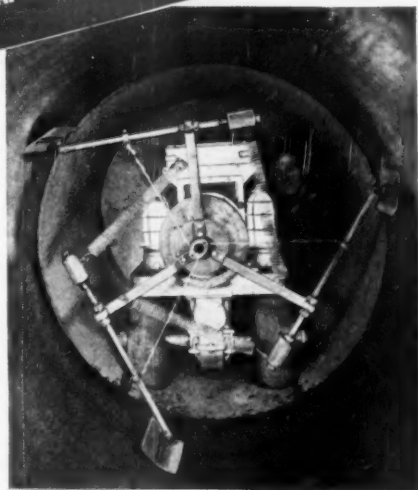
At the close of the year 1949, according to the National Safety Council, not a single Bangor, Me., city employee was absent from his work on account of a 1949 injury; the city was paying no compensation insurance wages to any city employee for 1949 injuries; and there was no outstanding medical charge for 1949 injury. During the year, with a man-hour exposure of 1.25 million hours, the city had a frequency rate of 23; there were 29 lost-time injuries; and 348 days were lost.



▶▶▶ PIPE LINING
FACTS NO. 3

▶▶▶▶ The Standard Specifications for cement-mortar protective coatings issued by the American Water Works Association provide: "Interior of the entire line, including both curves and tangents, shall be by centrifugal machine . . . the machine shall apply the mortar by centrifugal action without the use of compressed air and follow its application by automatic trowelling to a uniform thickness and smooth finished surface."

The strict adherence to these specifications by Centriline insures a continuous, dense, smooth lining—applied without rebound—that means restored carrying capacity perpetually sustained and longer life to mains. If pipelines are losing efficiency it is time to consider Centriline. Our engineers stand ready to assist you, without obligation,

**CENTRILINE CORPORATION**

A subsidiary of Raymond Concrete Pipe Co.
140 CEDAR STREET • NEW YORK 6, N.Y.

Branch Offices in all Principal Cities
in the United States and Latin America.



CEMENT MORTAR LININGS FOR WATER MAINS
Centrifugally Applied in Strict Conformity
with A.W.W.A. Specifications

▶▶▶▶ WRITE TODAY
FOR THE 28 PAGE
CENTRILINE CATALOG

★ DIRECTORY ★ OF CONSULTING ENGINEERS

ALBRIGHT & FRIEL, Inc. Consulting Engineers

WATER, SEWAGE & INDUSTRIAL WASTE
PROBLEMS, AIRFIELDS, REFUSE IN-
CINERATORS & POWER PLANTS
INDUSTRIAL BUILDINGS
CITY PLANNING REPORTS
VALUATIONS LABORATORY
121 South Broad St. Philadelphia 7, Pa.

Charles B. Burdick Louis R. Howson
Donald H. Maxwell

ALVORD, BURDICK & HOWSON

Engineers
Water Works, Water Purification,
Flood Relief, Sewerage, Sewage Dis-
posal, Drainage, Appraisals, Power
Generation
Civic Opera Building Chicago

BANISTER ENGINEERING CO. Consulting Engineers

POWER PLANTS, WATERWORKS, CITY
PLANNING, RURAL ELECTRIFICATION,
SANITATION, WASTE PROBLEMS,
AIRPORTS, STREET IMPROVEMENTS
1549 University Ave.
St. Paul 4, Minn.

BARKER & WHEELER Engineers

Water Supply, Sewerage, Sewage Disposal,
Power, Public Utilities and Industrial
Valuations and Rates
36 State Street, Albany 7, N. Y.
11 Park Place, New York City 7

BLACK & VEATCH

Consulting Engineers

Water - Sewage - Electricity - Industry
Reports, Design, Supervision of Construction
Investigations, Valuations and Rates
4706 Broadway Kansas City 2, Missouri

CLINTON L. BOGERT ASSOCIATES

Consulting Engineers

Clinton L. Bogert Ivan L. Bogert
J. M. M. Greg Robert A. Lincoln
Donald M. Dittmars Arthur P. Ackerman
Water and Sewage Works
Refuse Disposal Industrial Wastes
Drainage Flood Control
624 Madison Ave., New York 22, N. Y.

BOWE, ALBERTSON & ASSOCIATES Engineers

Industrial Wastes—Refuse
Reports—Designs—Estimates
Disposal—Municipal Projects
Airfields—Industrial Buildings
Water and Sewage Works
Valuations—Laboratory Service
110 William St., New York 7, N. Y.

BROWN ENGINEERING CO.

Consulting Engineers

Waterworks, Sewage Disposal, Airports
Street Improvements, Power Plants
Electric Distribution, Rates

K. P. BUILDING DES MOINES, IOWA

BUCK, SEIFERT AND JOST

Consulting Engineers

(FORMERLY NICHOLAS S. HILL ASSOCIATES)
Water Supply Sewage Disposal
Hydraulic Developments
Reports, Investigations, Valuations
Rates, Design, Construction, Operation
Management, Chemical and
Biological Laboratories
112 East 19th St. New York City

BURGESS & NIPLE

Consulting Engineers

Established 1908
Water supply, treatment and distribution
Sewage and industrial waste disposal
Investigations, reports, appraisals, rates
Airports, Municipal Engineering, Supervision
584 E. Broad Street Columbus 13, Ohio

BURNS & McDONNELL ENGINEERING CO.

Consulting Engineers — 50th Year

Waterworks—Water Purification—Sewerage
Power Plants—Steam—Diesel—Hydro
Electric Systems—Rate Reports—Valuations
Refuse & Industrial Waste Disposal
Box 7068 Country Club Station
Kansas City 2, Missouri

JAMES M. CAIRD

Assoc. Am. Soc. C. E.
Chemist and Bacteriologist

Water Analysts and Tests of Filter
Plants
Office and Laboratory
Cannon Bldg., Broadway & 2nd St.
Troy, N. Y.

CAPITOL ENGINEERING CORP.

Engineers—Constructors
Management

Water Works Sewage Systems
Design and Surveys Roads and Streets
Planning Airports
Bridges Dams
Executive Offices
DILLSBURG, PENNSYLVANIA

THE CHESTER ENGINEERS

Water Supply and Purification
Sewerage and Sewage Treatment
Power Developments and Applications
Investigations and Reports
Valuations and Rates

210 E. Park Way at Sandusky
Pittsburgh 12, Pa.

MICHAEL BAKER, JR., INC.

The Baker Engineers

CIVIL ENGINEERS — PLANNERS AND SURVEYORS

Pipe Line Surveys — Municipal Engineers — Airport Design — Sewage Disposal Systems —
Water Works Design and Operation — Surveys and Maps — City Planning —
Highway Design — Construction Surveys
HOME OFFICE: ROCHESTER, PA.
Branch Offices

Jackson, Miss. Harrisburg, Pa.

Mechanized Highway Maintenance

TO cope with the increasing costs of labor, Wayne County, Mich., has developed the use of mechanical equipment, and by this means has been able to decrease unit costs of maintenance. Road ditches are cleaned by machines, one unit pushing the dirt to the edge of the roadway and another picking it up and loading it into a truck.

For shallow ditches, a diesel-powered grader with a vertical blade attachment for back-sloping has saved many hours of labor. For larger and deeper ditches, a back-filling machine has been adapted to the work.

One of the largest items of maintenance on a gravel road consists of reshaping the surface. This is necessary several times a year to remove ruts and washboards, and to push the loose gravel toward the center. This operation has been completely mechanized by using motor graders and truck scrapers. The truck-mounted scraper is located between the front and rear wheels of a truck. It has added speed to the blading operation and also economy.

The acquisition of power driven chain saws has reduced the cost of tree removal approximately one-third. Where it is necessary to remove stumps, an air compressor equipped with proper tools, including sharp asphalt spades, is used and the work is done with less labor and in a shorter time. Such equipment has simplified tree trimming and the removal of dead trees. During the past year, nearly a thousand dead trees were removed from roadsides throughout Wayne County.

Chemicals have given excellent results in weed control. 2,4-D and its estaron derivatives have been used, mostly the liquid types. Four pints of this material in 100 gallons of water are applied per acre, using spray guns with 100 lbs. working pressure. Spraying for poison ivy control was done over 1,000 acres of Middle Rouge Parkway, with excellent results. The control of weeds reduced the costs of mowing.

In order to reduce the expense of patching old surfaces, a new method was developed. Instead of a continuous resurfacing job which would require considerable new material, only the worst sections of the pavement are resurfaced. Also, instead of the usual application of 1-inch binder course topped with a 1-inch wearing surface, a single application

1 inch in thickness is used. This means that sections of the roadway 200 to 1,000 ft. in lengths are resurfaced with the 1-inch asphaltic concrete, and that sections of equal or greater length not so seriously in need of repair are skipped. The asphaltic mix used for this work differs slightly in the gradation of aggregates from the regular 2-inch resurfacing used. The size of aggregates is roughly the medium of those used heretofore for the binder and wearing courses. The result is a "tight" surface that gives good stability and satisfactory riding and wearing qualities.

Skin patching has also been used on concrete pavements which have sealed. The road surface is first cleaned; it is then given an application of light cutback asphalt or emulsion, upon which a thin layer of stone chips is spread and rolled.

John E. Hiltz is engineer of highway maintenance for Wayne County, and Milford N. Brown is general superintendent. Carl F. Martin is in charge of roadside development. These data are from the 43rd annual report of the Board of County Road Commissioners.

Power Requirements for Pumping Sewage

The power required for pumping sewage in terms of kwh per million gallons lifted one foot have been reported by the Bureau of Engineering of San Francisco. In the table below, flow is shown in million gallons per day, head is the average operating head in feet, and kwh is per million foot gallons.

Station	Flow	Head	kwh
Morina	5.85	38.0	5.09
Commercial	0.74	20.0	6.34
Seacliff #1	0.0021	49.0	6.50
Seacliff #2	1.48	94.0	6.06
Parkmerced	0.388	123.0	5.51
Vicente	0.127	56.0	6.92
Fitzgerald	0.070	48.0	7.00
Pinelake	0.0016	56.0	9.20
Hyde	0.0265	29.0	7.6

Drainage for a Major Airport

In the construction of the Detroit-Wayne Major Airport, 75,000 ft. of trunk line sewers and collecting laterals have already been constructed and an additional 25,000 ft. will be built this year. A pumping station, designed to handle 350 cfs has been constructed. This station has five pumps, electrically driven, ranging in capacity from 25 to 100 cubic feet per second.

<p>L. COFF Consulting Engineers Prestressed Concrete Structures Design Estimates, Erection Methods Supervision 198 Broadway New York 7, N. Y. Tel. Co. 7-7553</p>	<p>GREELEY & HANSEN Engineers Water Supply, Water Purification Sewerage, Sewage Treatment Flood Control, Drainage, Refuse Disposal 220 S. State Street, Chicago 4</p>
<p>CHAS. W. COLE & SON Consulting Engineers Sewerage, Sewage Treatment, Industrial Wastes, Water Supply, Water Treatment, Airports, Industrial Buildings Design and Supervision ETIAS W. Cole, Sr. Chas. W. Cole, Jr. Ralph J. Bushee M. J. McBriain Wilbur H. Gartner 220 W. LaSalle South Bond, Ind.</p>	<p>HOWARD R. GREEN CO. Consulting Engineers DESIGN AND SUPERVISION OF MUNICIPAL DEVELOPMENTS Water Works and Treatment—Sewers and Sewage Disposal—Investigations and Valuations 288-10 Beaver Bldg., Cedar Rapids, Iowa Established 1913</p>
<p>CONSOER, TOWNSEND & ASSOCIATES Water Supply — Sewerage — Flood Control & Drainage — Bridges — Express Highways — Paving — Power Plants — Appraisals — Reports — Traffic Studies — Airports 351 East Ohio Street Chicago 11, Ill.</p>	<p>JOHN J. HARTE CO. Engineers Waterworks, Sewerage, Treatment Plants, Gas Systems, Street and Storm Drainage, Improvements, Public Buildings, Airports ATLANTA, GEORGIA</p>
<p>OSCAR CORSON Consulting Engineers Sewerage Systems — Sewage & Industrial Waste Treatment — Water Supply — Drainage Airfields — Roads — Railroads Const. Surveys — Land Subdivisions Design — Supervision — Industrial Layout 902 Highland Avenue, Ambler, Pa.</p>	<p>HILL & HILL Engineers Sewage and Waste Disposal, Water Supply and Filtration, Dams, Reservoirs, Tunnels, Airport and Topographic Surveys Home Office: 24 E. Main St., North East, Pa.</p>
<p>DE LEUW, CATHER & COMPANY Consulting Engineers Public Transit, Traffic and Parking Problems Railroads Major Thoroughfares Grade Separations Subways Expressways Power Plants Tunnels Municipal Works 150 North Wacker Drive, Chicago 6, Ill. 79 McAllister St., San Francisco 2, Calif.</p>	<p>HITCHCOCK & ESTABROOK, INC. LESTER D. LEE, ASSOCIATE Consultants to Municipalities Since 1920 Water, Sewerage, Paving, Power Plants, Airports, Public Buildings, Surveys and Appraisals 248 Sheridan Road 521 Sexton Building Menominee, Michigan Minneapolis 15, Minn.</p>
<p>A. W. DOW, Inc. Chemical Engineers Consulting Paving Engineers Mem. Am. Inst. Ch. Engrs. Asphalt, Bitumens, Tar, Waterproofing, Paving, Engineering, Materials 801 Second Avenue New York</p>	<p>JONES, HENRY & SCHOONMAKER (Formerly Jones & Henry) Consulting Sanitary Engineers Water Works Sewerage and Treatment Waste Disposal Security Bldg. Toledo 4, Ohio</p>
<p>GANNETT FLEMING CORDDRY & CARPENTER, Inc. Engineers Water Works, Sewerage, Industrial Wastes & Garbage Disposal Roads, Airports, Bridges & Flood Control Town Planning, Appraisals, Investigations & Reports Harrisburg, Pa. Pittsburgh, Pa. Daytona Beach, Florida</p>	<p>ENGINEERING OFFICE OF CLYDE C. KENNEDY Complete Engineering Service For More Than a Quarter Century Investigations, Reports, Design, Supervision of Construction, Plant Operation Water Supply, Water Conditioning, Sewerage, Sewage and Industrial Waste Treatment CHEMICAL AND BIOLOGICAL LABORATORY 604 Mission Street San Francisco 5</p>
<p>GILBERT ASSOCIATES, INC. Engineers and Consultants Power Plant Engineering Water Supply and Purification Sewage and Industrial Waste Treatment Chemical Laboratory Service New York Reading, Pa. Philadelphia Houston Washington</p>	<p>MORRIS KNOWLES, INC. Engineers Water Supply and Purification, Sewerage and Sewage Disposal, Industrial Waste, Valuations, Laboratory, City Planning 1312 Park Building, Pittsburgh 22, Pa.</p>
<p>ROBERT AND COMPANY ASSOCIATES Architects and Engineers ATLANTA WATER SUPPLY • SEWAGE DISPOSAL • INCINERATORS • POWER PLANTS</p>	

This directory is continued on page 78

HAROLD M. LEWIS <i>Consulting Engineer—City Planner</i> Analyses of urban problems, master plans, zoning, parking, airports, subdivisions, redevelopment, Reports—plans—ordinances 15 Park Row New York 7, N. Y.	BOYD E. PHELPS, INC. <i>Architects-Engineers</i> Water Supply and Purification Sewage & Industrial Waste Treatment Municipal Buildings Airfields, Power Plants Reports & Investigations Michigan City Indiana Indianapolis Indiana	SMITH & GILLESPIE <i>Municipal and Consulting Engineers</i> Water Supply, Water Purification, Sewerage, Sewage Disposal, Drainage Refuse Disposal, Gas Systems, Power Plants Airports Jacksonville Florida
WM. S. LOZIER CO. <i>Consulting Engineers</i> Sewerage, Sewage Disposal, Water Supply, Water Purification, Refuse Disposal 10 Gibbs Street Rochester 4, N. Y.	MALCOLM PIRNIE ENGINEERS <i>Civil & Sanitary Engineers</i> Malcolm Pirnie Ernest W. Whitlock Richard Hazen G. O. Werner, Jr. Investigations, Reports, Plans Supervision of Construction and Operations Appraisals and Rates 25 W. 43rd St. New York 18, N. Y.	STANLEY ENGINEERING COMPANY <i>Consulting Engineers</i> Airports—Drainage Electric Power—Waterworks Sewerage—Valuations—Rate Studies Municipal Buildings Hershey Building Muscatine, Ia.
METCALF & EDDY <i>Engineers</i> Water, Sewage, Drainage, Refuse and Industrial Wastes Problems Airfields Laboratory Valuations Stutler Building 111 Sutter St. Boston 16 San Francisco 4	THE PITOMETER COMPANY <i>Engineers</i> Water Waste Surveys Trunk Main Surveys Water Distribution Studies Water Measurements and Tests Water Wheels, Pumps, Meters New York 50 Church St.	ALDEN E. STILSON & ASSOCIATES <i>Consulting Engineers Limited</i> Water Supply, Sewerage, Waste Disposal, Mechanical, Structural Surveys, Reports, Appraisals 209 So. High St. Columbus, Ohio
PALMER AND BAKER, INC. <i>Consulting Engineers</i> For Problems of Transportation Subaqueous Vehicular Tunnels Rock Tunnels, Utility Tunnels, Bridges, Grade Separations, Highways, Airports, Traffic Studies, Parking Problems Waterfront and Harbor Structures Mobile, Alabama	RUSSELL & AXON <i>Consulting Engineers</i> Geo. S. Russell F. E. Wenger Joe Williamson, Jr. Water Works, Sewerage, Sewage Disposal, Power Plants, Appraisals 408 Olive St. Municipal Airport St. Louis 2, Mo. Daytona Beach, Fla.	EMERSON D. WERTZ AND ASSOCIATES <i>Municipal Engineers</i> Waterworks, Drainage, Refuse Disposal, Sewerage, Streets, Industrial Wastes 116½ East High Street, Bryan, Ohio

Newly Improved OK CHAMPION POWER SEWER CLEANER



DON'T LOSE Sewer Capacity

Clear your sewer lines regularly. Keep up full carrying capacity and you save money—in lower maintenance cost and avoiding costly backwash. Order OK Champion Power Sewer Cleaner equipment and your men remove roots, dirt and other obstructions from any storm or sanitary sewer in ONE operation. All men work above street level.

OK Champion cleaners are regularly clearing sewers all over the world. New improvements make them better than ever. Send for literature.

CHAMPION CORPORATION
Hammond, Indiana

GET FULL FACTS NOW!

CHAMPION CORPORATION, 4752 Sheffield Ave., Hammond, Ind. Please send information on how the Improved OK Champion Power Sewer Cleaner cuts sewer cleaning costs.

NAME.....TITLE.....

ADDRESS.....

Write for Catalog

Floatless ALL ELECTRIC LIQUID LEVEL CONTROLS

FIRST and FOREMOST
IN THE FLOATLESS
CONTROL FIELD

**B/W CONTROLLER
CORPORATION**

2224 E. MAPLE ROAD
BIRMINGHAM, MICH.



PUBLIC WORKS Equipment News

Trucks Can Load Themselves with This Unit

One man handles all three jobs with this unit—he loads the truck, drives it to the dump and dumps it. This one-man loader makes the ordinary dump truck into a complete unit, permitting the truck to



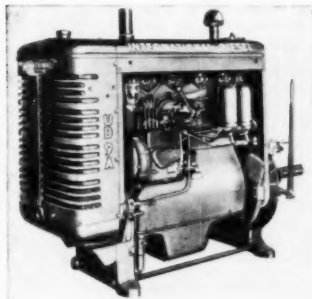
Holmes-Owen truck loader.

do its own light grading, digging and scooping, as well as loading. Hydraulic controls are furnished; when hauling, the loader folds out of the way. Shovel capacity is half-yard. Extremely useful for cleaning and maintaining streets, highway maintenance, handling materials for ice control, snow removal, and numerous other jobs. For excellent descriptive booklet write to Ernest Holmes Co., Chattanooga, Tenn., or use the coupon.

Use coupon on page 85; circle No. 6-1.

More Powerful International Diesels

Increased power and improved performance are features of the now available 4-cylinder UD-9A engines made by International.



IHC 4-cylinder diesel.

Compression ratios are higher, and performance is better. The UD-9A delivers 62.5 hp at 1,600-rpm and weighs only 2,060 pounds. Starting is by gasoline conversion. Complete specifications for these engines, which are designed for use in motor graders and other self-propelled vehicles, can be obtained from International Harvester Corp., Consumer Relations Dept., 180 N. Michigan Ave., Chicago 1, Ill., or by using the coupon.

Use coupon on page 85; circle No. 6-2.

Wheel Tractor for Highway and Municipal Work

This is a new wheel tractor designed especially for highway, municipal, airport and similar



Wheel tractor with mower.

work. It is shown here with the MI-7 mower attachment, which is driven by power takeoff. This mower can be used from 45° below to 45° above horizontal, and is provided with a safety swing-back release. The tractor can handle up to 5 gangs of rotary mowers for golf course and similar use. Ask for information on the MI tractor from Deere & Co., Moline, Ill., or use the coupon.

Use coupon on page 85; circle No. 6-3.

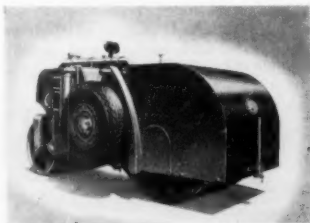
A Multi-Flow Rotameter

Two or more rotameter tubes can be combined in this unit to give measurements of related flows. It is used with gases or liquids, and for such services as feeds to parallel filters, continuous dilution and at other places where compactness and close correlation of related flows are desirable. Brooks Rotameter Co., Lansdale, Pa.

Use coupon on page 85; circle No. 6-4.

Portable 5-Ton Retractable Wheel Roller

A portable, completely self-contained unit, this roller has a broad range of applications for road building and maintenance. It is 5-ton; it can be towed at normal highway speeds, traveling on its



Retractable wheel roller.

own pneumatic tires with 9 inches ground clearance. It uses its own power to raise and lower the trailing mechanism. It is described fully on Bulletin T-143, which can be obtained from Huber Mfg Co., Marion, O., or by using the coupon.

Use coupon on page 85; circle No. 6-5.

Faster and Lower Cost Service Pipe Installation

Features of this fast earth boring machine are a full length sled mount and an air driven cable



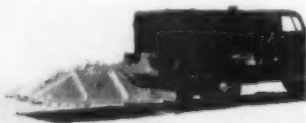
Bores 2" and 2½" holes.

winch which moves the entire machine along. Rapid boring of 2-inch and 2½-inch holes is claimed in rock, hardpan and clay. It is especially valuable in cramped positions. The unit is only 8 ins. wide and weighs 150 pounds. It is especially useful for house services and for putting pipe through embankments. Further information from Hydrauger Corp., Ltd., 681 Market St., San Francisco, Calif., or by using the coupon.

Use coupon on page 85; circle No. 6-5.

Truck-Mounted Asphalt Surface Heater

One man operating this machine can remove 3,000 sq. yds. of asphalt pavement to an average depth of 1 inch in 8 hours, according to the manufacturers. It is also efficient on plant-mix, rock asphalt and asphalt block. Worn and corrugated pave-



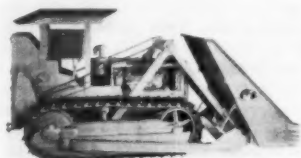
Asphalt surface heater.

ments can be restored to original efficiency at a marked saving. Full data from Asphalt Maintenance Co., 41 Park Row, New York 7, N. Y., or by using the coupon.

Use coupon on page 85; circle No. 6-7.

Overshot Loader for Tractor Mounting

With a rated bucket capacity of 1 yard and a loading cycle of 20 sec-



1-yard overshot loader.

onds, this machine will handle 125 cu. yds. of bank run material per 50-min. hour, with no increase in fuel consumption over normal dozing operations. This is the Model 4-C loader and it is readily attached to the Caterpillar D4, the Allis-Chalmers HD-5 or the International TD-9 tractor. Other loader sizes are available, from 1½ to 3½ yards. Literature describing this 4-C unit

is available from John Austin, Inc., Denver, Colo., or by using the coupon.

Use coupon on page 85; circle No. 6-8.

Wheel Tractor Mounted Loader

There are numerous uses for this equipment by state and county highway departments, cities and villages. In addition to the ¾-yd. bucket (1-yd. for loose materials, 1¼-yd. for snow), a crane hook, fork, dozer blade or snow plow can be attached. The power unit is 40 hp. Travels up to 14 mph; operates very quickly and easily and is engineered for operator safety. Full data from Contractors Machinery Co., Inc., Batavia, N. Y., or use the coupon.

Use coupon on page 85; circle No. 6-9.



Tractor mounted loader.

McWANE B & S CAST IRON PIPE

Easy to:

- CUT
- TAP
- LAY

Meets rigid Standard
Class 150 Federal Spec-
ifications. 500-pound
test.

CAST IN
18' foot Lengths

McWANE CAST IRON PIPE CO.
BIRMINGHAM 2, ALA.

FRINK SNO-PLOWS

TRADE MARK

FRINK SNO-PLOWS, INC.

CLAYTON 1000 Islands NEW YORK

DAVENPORT-BESLER CORP. DAVENPORT, IOWA
FRINK SNO-PLOWS OF CAN. LTD. TORONTO, ONT.

ANTHRAFILT

Trade Mark Reg. U. S. Pat. Off.

As a Modern Filter Medium Has Outstanding
Advantages Over Sand & Quartz Media

1. Length of Filter runs doubled
2. Only about one half as much wash water required
3. Less caking, caking or haling with mud, lime, iron or manganese
4. Filters out of service less because of shorter wash cycle
5. Better removal of bacteria, micro-organic matter, taste and odor
6. Increased Filter output with better quality effluent
7. Not just the top portion, but the entire bed aids in filtering
8. Can be used in all types of Filters using a filter media
9. A perfect supporting media for synthetic resins
10. An ideal Filter media for industrial acid & alkaline solutions
11. Decidedly advantageous for removal of fibrous material as found in swimming pool filters.

Additional information, recommendations and quotations furnished upon request by

PALMER FILTER EQUIPMENT COMPANY

822 East 8th Street, P. O. Box 1655 Erie, Pennsylvania

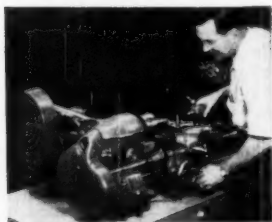
Representing

ANTHRACITE EQUIPMENT CORPORATION

Anthrachte Institute Building, Wilkes-Barre, Pennsylvania

A Light-Weight 10-inch Lathe

This new 10-inch quick change gear lathe is available in four bed lengths, with a complete line of tools, attachments and accessories, includ-



South Bend 10" lathe.

ing a taper attachment, handlever and handwheel collet attachments, collets, and a milling device. The quick-change gear box (supplied on Model A and Toolroom lathes) permits changing thread-cutting, power longitudinal and power cross-feeds instantly. Two types of horizontal drive units are available—a 12-speed (48 to 1,435 rpm) flat belt and a 16-speed (52 to 1,365 rpm) V belt. Fuller information from South Bend Lathe Works, South Bend 22, Ind., or by using the coupon.

Use coupon on page 85; circle No. 6-10.

Refuse Collection Unit for Small and Large Cities

Because of its low initial cost and the fact that it can be used on lighter trucks, this new enclosed refuse collection unit will meet the needs of many small municipalities. An effective packing device insures a full body and maximum capacity. It is made in two sizes—9 and 12 cu. yds. This Pax-All unit was designed by George Wood, who developed the original packing type refuse collection unit; and it is manufactured by St. Paul Division, Gar Wood Industries, Inc. Data on this low-loading unit from the manufacturer at 2207 University Ave., SE, Minneapolis, Minn., or by using the coupon.

Use coupon on page 85; circle No. 6-11.



Modern-type refuse collector.

How to Prevent Hydrant Freezing

The best way to keep hydrants from freezing in cold weather is to drain them. The best way to drain them is with the Adams jet drain. With no other equipment but this and a small air compressor, a hydrant can be completely drained in 1 minute, with no labor. The unit weighs less than 5 pounds, and so is easily portable. Experience indicates it will save at least 50% in time and labor costs and, in addition it prevents damages due to freezing of hydrants that are not drained. For full information write Jet Drain Engineering Co., 215 No. Fayette St., Saginaw, Mich., or use the coupon.

Use coupon on page 85; circle No. 6-12.

One-Man Leaf Collector

This leaf collector can be attached easily to Ford or Ferguson tractors, and also is available on a tractor as a complete unit. It is operated by one man. A suction unit collects leaves and twigs (passing stones, nails and glass) and delivers them into a hopper or metal basket which can be dumped directly into a truck. Either wet and packed, or dry leaves are handled readily. Easy maneuverability eliminates the need for brush

The World's Most Efficient

CONCRETE DRILL

THE TILDEN ROTARY KONKRETE KORE DRILL

gives lowest cost per foot of concrete drilled because it:

- Drills at 2 to 6 inches per minute
- Drills reinforcing bars and beams in concrete
- Drills up to 30 feet of concrete without resharpening
- Gives straight, clean holes for anchors, conduit, etc.
- Uses ordinary electric drill

Quiet cutting action gives minimum disturbance of surrounding activities.

New, exclusive "centerless" design of drills from 1/2" through 7/16" diameters is 3 to 4 times more efficient than ordinary pointed drills. Concrete is penetrated faster with 80% less pressure. Prices on these drills have been reduced by as much as 50%.



U. S. Pat. No. 2,596,474

Tilden drill bits are available in standard sizes of 1/2", 3/4", 1", 1 1/2", 2", 3", 4", 5", 6", 8", 10", 12", 14", 16", 18", 20", 24", 30", 36", 42", 48", 54", 60", 72", 84", 96", 108", 120", 144", 168", 192", 216", 240", 270", 300", 324", 360", 384", 408", 432", 456", 480", 504", 528", 552", 576", 600", 624", 648", 672", 696", 720", 744", 768", 792", 816", 840", 864", 888", 912", 936", 960", 984", 1008", 1032", 1056", 1080", 1104", 1128", 1152", 1176", 1200", 1224", 1248", 1272", 1296", 1320", 1344", 1368", 1392", 1416", 1440", 1464", 1488", 1512", 1536", 1560", 1584", 1608", 1632", 1656", 1680", 1704", 1728", 1752", 1776", 1800", 1824", 1848", 1872", 1896", 1920", 1944", 1968", 1992", 2016", 2040", 2064", 2088", 2112", 2136", 2160, etc.

Write today for catalog with complete details.

TILDEN TOOL MANUFACTURING COMPANY

1995 NO. FAIR OAKS, PASADENA 3, CALIFORNIA

a "10-TON ROLLER" that weighs only 240 lbs

Super-tamps, finishes, cures 45 to 60 sq. ft. per minute of bituminous or dry concrete pavement patching, mastic or cement composition floor base, or earth. Works flush to walls, curbs, tracks, manholes.

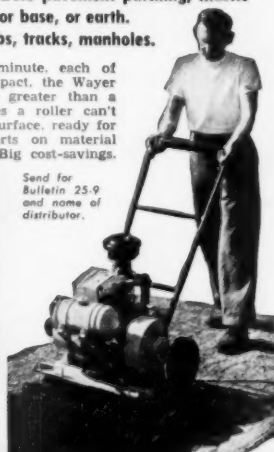
Striking 1900 blows per minute, each of more than 1250 ft. lbs. impact, the Wayer Impactor produces density greater than a 10-ton roller and in places a roller can't reach. Heated plate cures surface, ready for immediate traffic. Transports on material truck. One man operates. Big cost-savings.



Can work flush to any edge

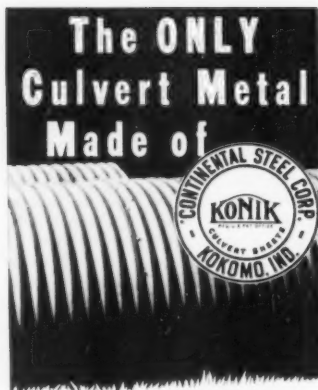


Send for Bulletin 25-9 and name of distributor.



WAYER IMPACTOR

Wayer Impactor, Incorporated, 12 N. Third St., Columbus 15, Ohio



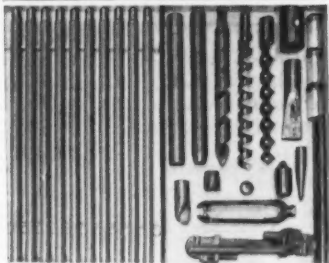
For culvert sheets that withstand the abuses of installation and the rigors of exposure, you can't beat Continental KONIK. This open hearth culvert metal contains copper, nickel, chromium, and other elements that add strength and long life. KONIK, further protected by a heavy coating of zinc, is an ideal culvert metal that gives "carefree" service for years and years. See it at your distributor or write Continental at Kokomo, Indiana.

CERTIFIED AND GUARANTEED

Ask your culvert distributor to see the KONIK Warranty. Read the Certified Analysis...it is your guarantee that KONIK offers extra years of culvert service.



SOIL SAMPLING KIT



- 12 soil and earth sampling tools in handy steel box.

- Can be carried in any automobile.

30 years experience has proved these tools will recover accurate samples from practically all earth materials.

• **MANY USES**—brick and clay materials—foundation test borings—gold bearing sands—kaolin and clay for ceramics—sand and gravel pits—sub-grade testing for highways and airfield runways—base materials.

- Send for Bulletin 26-PW •

ACKER DRILL CO., INC.
SCRANTON 3, PA.



How to collect leaves.

men to accompany the unit. Full information from J. W. Simcox, Box 287, LaPorte, Ind., or use the coupon.

Use coupon on page 85; circle No. 6-13.

Removal of Grit from Sewage

This grit channel and regulator is designed to maintain a constant velocity, regardless of sewage flow quantity, so as to accomplish effective removal of grit from sewage. Technical Supplement CR describes this device, shows how it can be applied in sewage treatment plants, and discusses the design factors to be employed. By a study of this 8-page supplement, an engineer can design an installation for his plant. Part I discusses the chamber cross-section; part II, covers the length of channel; example 1 covers design for low head loss; and example 2 describes design for normal head

MAGNETIC DIPPING NEEDLE \$17.50

with 3 section
telescoping handle
\$22.25

Write Today for
68-Page Catalog
W. S. DARLEY & CO.
Chicago 12



STREET, SEWER AND WATER CASTINGS



Gutter Crossing Plates
Valve and Lamphole Covers

Write for Catalog and Prices

SOUTH BEND FOUNDRY CO.
Gray Iron and Semi-Steel Castings
SOUTH BEND 23, INDIANA

PUBLIC WORKS for June, 1950

loss. For a copy of Supplement CR, write American Well Works, Aurora, Ill., or use the coupon.

Use coupon on page 85; circle No. 6-14.

Water Hardness Easily Determined

The S & B method of determining water hardness is adaptable and precise for ranges from 1 ppm of total hardness to sea water concentrations. Other than filtration, no manipulation of the sample is necessary. An indicator is used, giving a color range for easy and quick reading. Write for 28x7446, which describes step-by-step details, to Allis-Chalmers Mfg. Co., 1189 So. 70th St., Milwaukee, Wisc., or use the coupon.

Use coupon on page 85; circle No. 6-15.

Truck Mixers and Agitators

Lighter weight, shorter length and reduced cost of upkeep are advantages claimed for the new Jaeger "Payloador" model truck mixers. Weight reductions range from 600 to 1,600 pounds; frame length reductions range from 9 to 13 ins. These models are made in 2, 3, 4½ and 5½ cu. yd. sizes as mixers; as agitators, the capacity is about 50% greater. Many other advantages are covered in data available from Jaeger Machine Co., Columbus, Ohio, or by using the coupon.

Use coupon on page 85; circle No. 6-16.

CAST IRON BELL & SPIGOT WATER PIPE AT A DRASTIC REDUCTION IN PRICE

6" Class "B" — 1,635 feet
8" Class "250" — 3,128 feet
10" Class "B" — 14,639 feet
12" Class "B" — 602 feet

Save up to 50% on your cast iron pipe requirements.

Write — Wire — Phone
SONKEN-GALAMBA CORP.
2nd and Riverview (X-585) Kansas City 18,
Kansas
Hatcher 9243

DAVEY COMPRESSORS



ONLY COMPRESSOR
WITH PERMANENT

PEAK
EFFICIENCY
LIFETIME
VALVES

DAVEY COMPRESSOR CO.
KENT, OHIO

PERSONAL NEWS

Arthur D. Weston, former Director and Chief Engineer of the Massachusetts Department of Health, has affiliated with Charles A. Maguire & Associates, consulting engineers of Boston and Providence.

Robert T. Colburn has been made a member of the firm of Chas. T. Main, Inc., consulting engineer of Boston, Mass.

Francis F. Friel has been appointed a member of the Board of Direction of the ASCE, succeeding to the vacancy created by the death of Joel D. Justin.

Hurley, Capocefalo & Associates have recently opened an office as consulting engineers at 348 Main St., Winsted, Conn.; another office is at 119 Ann St., Hartford. The firm includes Robert A. Hurley, former governor of Connecticut and Joseph Doman, long time sanitary engineer.

Michael Baker, Jr., Inc., consulting engineer firm of Rochester, Pa.,

will mark its tenth anniversary on May 1. From a one-man firm ten years ago, 550 persons are now employed. Engineering work has been carried on all over the world. In addition to the home office at Rochester, offices are maintained at Harrisburg, Pa., and Jackson, Miss.

Nat H. Neff has been appointed engineer for the Orange County Sanitation Districts, 1104 West 8th St., Santa Ana, Calif.

Charles C. Agar, chief of the Water Pollution Control Section of the New York State Department of Health, died on Feb. 15. He was a veteran of both wars; in World War II he was in the Sanitary Corps and he held the rank of Lt. Col. in the reserve.

ASSOCIATIONS AND MEETINGS

The 30th annual meeting of the Highway Research Board will be held in Washington, D. C., at the National Academy of Sciences, Jan. 8 to 12, 1951.

The Southwest Section of the

AWWA has tentatively set dates for meetings, as follows: 1950, New Orleans, La., Hotel Roosevelt, Oct. 15 to 18; 1951, Ft. Worth, Texas, Hotel Texas, Oct. 14 to 17; 1952, Little Rock, Ark., Hotel Marion, Oct. 12 to 15.

The 1950 North Carolina Water Works Operators' School will be held at Chapel Hill, N. C., June 4 to 9, in cooperation with the North Carolina Section AWWA. Clifford Pace is Asst. Director, Institute of Government, University of North Carolina, Chapel Hill, N. C.

The New England Water Works Association will hold its 69th annual convention at Poland Springs, Maine, Sept. 17 to 20.

A 3-day Industrial Waste Conference will be held June 26-28 at Massachusetts Institute of Technology. Professors Rolf Eliassen and Clair Sawyer will represent MIT on the committee.

The Department of Civil Engineering and Extension Services of the Pennsylvania State College, State College, Pa., will conduct a short course on flow measurement June 5 to 15.

One Man Gang

GOLDAK model 87

Featherweight

PIPE LOCATOR

Only the Goldak Model 87 offers these BIG features:

PENTODE TUBES: These tubes have biased voltage which makes possible sharply defined separation of closely spaced pipes.

MICROTUNING: The metal handle is quickly and rigidly locked for perfect electronic balancing.

APPROVED LICENSE: The Goldak Company manufactures the only Pipe Locator licensed by Western Electric, added assurance of better performance.

- EXACT location of buried pipes, mains, gates, tees, etc.
- Total weight, 11 lbs.—one man operation!
- Strong, positive location signal.
- Standard miniature radio tubes and flashlight batteries.
- Lasts a lifetime — guaranteed performance.

Write for FREE literature.

THE GOLDAK COMPANY

1545 W. GLENOAKS BLVD., GLENDALE 1, CALIF.



First low-cost, accurate spreader for

all base and surface aggregates, free-flowing bituminous mixtures, plant-mixed stabilized soil.

Up to 10" thickness.
Widths 8' to 12½' (25' in tandem)



Jaeger self-propelled Aggregate Spreader

4-wheels driven on subgrade—no traction to displace new-laid material. Long straightedge runners carry screed, average out subgrade irregularities, positively maintain correct course level. Blends joints. Quick and easy to adjust for width. Ask for Catalog and low price.

THE JAEGER MACHINE CO., Columbus 16, Ohio

Distributors in 130 Cities of the U. S. and Canada.

**BITUMINOUS PAVERS • CONCRETE SPREADERS, FINISHERS
COMPRESSORS • PUMPS • MIXERS • HOISTS • TOWERS**

LEAK DETECTOR

Simple and Easy to Use



Inspect Up to 2 Miles an Hour

You'll get a lot of use and satisfaction from a "Universal" Leak Detector. A factory-trained technician will make sure your own men know how to use it on your own pipe lines. It is so efficient you can make rough surveys with it at the rate of two miles per hour.

Locate Your Leaks Quickly!

You can begin locating leaks immediately. You only dig one hole when you use the "Universal" Leak Detector.

Write for full details

Write today for latest bulletin and prices.

LEAK DETECTOR COMPANY

625 Hanna Building, Cleveland 15, Ohio

Quality that Lives

Mechanical equipment for water filtration that carries the Roberts Filter nameplate has long been recognized as equipment that gives lasting service. Installations thirty and more years old are still working "round the clock". However, even the finest equipment may need a replacement part occasionally, then you'll be glad you have Roberts Filter, for no part, however small, is an orphan after installation. Replacement parts can be supplied quickly, eliminating delays that are not only costly but often vital.

For water treatment equipment with quality that lives—specify Roberts Filter.

MECHANICAL EQUIPMENT
BY
ROBERTS FILTER MFG. CO.
DARBY, PENNA.

ROBERTS FILTER
MANUFACTURING CO.
640 COLUMBIA AVE., DARBY, PA.

INDEX OF ADVERTISEMENTS

Acker Drill Co.	82	Halligan, Inc.	89
Albright & Friel, Inc.	76	Haltzel Steel Form & Iron Co.	18
Allis Chalmers Tractor Div.	16 & 17	Hill & Hill	77
All Purpose Spreader Co.	66	Hitchcock & Estabrook	51
Alford, Burdick & Howson	76	Homelite Corp.	51
American Brass Co.	12	Hotel Strand	68
Armco Drainage & Metal Prod., Inc.	30	Hotpoint, Inc.	24 & 25
Anthracite Equipment Corp.	80	Hydraulic Development Corp.	84
Austin-Western Co.	2		
Ayer-McCarroll-Reagan Clay Co.	23	International Harvester Co.	13 & 27
Baker, Jr., Michael	76	Jaeger Machine Co.	55 & 83
Bannister Engineering Co.	76	Jeffery Mfg. Co.	21
Barker & Wheeler	76	Jones, Henry & Schoenmaker	77
Black & Veatch	76	Kennedy, Clyde C.	77
Robert Assoc., Clinton L.	76	Knowles, Inc., Morris	77
Bowen, Albertson Assoc.	76	Koshing Co.	86
Bowman Shale Co.	23		
Briggs & Stratton Corp.	14	Layne & Bowler, Inc.	19
Brown Engineering Co.	76	Leak Detector Co.	84
Buck, Sanford & Jost	76	Lewis, Harold M.	78
Buffalo Meter Co.	72	Link Belt Co.	72
Buffalo-Springfield Roller Co.	29	Littleford Bros.	63
Builders Providence	58	Link Joint Pipe Co.	91
Burgess & Niple	76	Lozier & Co., Wm. S.	78
Burns & McDonnell Eng. Co.	76		
B/W Controller Corp.	78	Metcalf & Eddy	78
		M & H Valve & Fittings Co.	50
Caird, James M.	76	McWane Cast Iron Pipe Co.	80
Capitol Engineering Corp.	76		
Carter Co., Ralph B.	55	National Clay Pipe Mfrs., Inc.	53
Cast Iron Pipe Research Assn.	10 & 11	National Fire Proofing Corp.	23
Centriline Corp.	75		
Champion Corp.	78	Oliver Corp.	22
Chicago Pump Co.	55		
Chester Engineers	76	Pacific Flush Tank Co.	88
Clark-Wilcox Co.	62	Palmer & Baker, Inc.	78
Cleveland Trencher Co., The	34	Permutit Co.	71
Coff, L. Sam, Chas. W.	77	Phelps, Inc., Boyd E.	78
Cole & Son, Chas. W.	77	Pirie Engineers, Malcolm	78
Consoer, Townsend & Assoc.	77	Pitometer Company	78
Continental Steel Corp.	82	Pomona Terra-Cotta Co.	23
Corson, Oscar	77	Pressure Concrete Co.	87
		Proportioners, Inc.	74
Darley & Co., W. S.	82		
Davey Compressor Co.	82	Quinn Wire & Iron Works	88
Deere, John	4		
DeKauw, Cathar & Co.	77	Robert & Co.	77
Dickey Clay Mfg. Co., W. S.	33	Roberts Filter Mfg. Co.	84
Dixon Crucible Co., Joseph	52	Rockwell Co., W. S.	68
Dempster Brothers, Inc.	8	Roots Connorsville Blower Corp.	20
Dow, A. W., Inc.	77	Russell & Axon, Const. Engrs.	78
Eagle Crusher Co.	65	Simplex Valve & Metal Co.	61
Elma Corp.	59	Skinner Co., M. B.	67
Ellis & Ford Mfg. Co.	89	Smith & Gillespie	78
		Sanlen-Galambos Corp.	82
Fisher Research Lab., Inc.	88	South Bend Foundry Co.	82
Fitch Recupercator Co.	40	Standard Steel Works	67
Flexible Sewer-Rod Equipment Co.	40	Stanley Engineering Co.	78
Frink Sno-Plows, Inc.	80	Stillan Assoc., Alden E.	78
		Superior Engine Division	15
Gar Wood Industries, Inc.	13		
Gannett, Fleming, Carlsdy & Carpenter, Inc.	77	Taylor & Co., W. A.	90
General American Transportation Corp.	26	Texas Vitrified Pipe Co.	23
Gilbert Associates, Inc.	77	Tilden Tool Mfg. Co.	81
Girdak Co.	83	Trickling Filter Floor Institute	23
Gorman-Rupp Co.	86		
Greeley & Hansen	77	Universal Atlas Cement Co.	28
Greenlee Tool Co.	47	Universal Concrete Pipe Co.	69
Green Co., Howard R.	77	U. S. Pipe & Foundry Co.	9
Harte Co., John J.	77	Wallace & Tiernan Co., Inc.	Back Cover
Hauk Mfg. Co.	48	Wayne Impactor, Inc.	81
Healy-Ruff Co.	90	Wertz & Assoc., Emerson D.	78
Heil Co.	65	Weston Co., L. A.	88
		Wolverine Tube Division	5
		Wood Co., R. D.	73

HYDRO-TITE

DEPENDABLE JOINTING COMPOUND

Seals Bell and Spigot Water Mains

Economical—Effective

Over 35 Years Of Dependable Performance

HYDRAULIC DEVELOPMENT CORP.

MAIN SALES OFFICE 50 CHURCH ST., N.Y.C.

General offices and works W. Medford Sta., Boston, Mass.



✓ CHECK THESE FREE CATALOGS NOW!

Mail Coupon to Order Those You Need

These helpful booklets are free. Just circle numbers you want on coupon and mail or write the manufacturer direct and mention **PUBLIC WORKS**. This service is restricted to those actually employed in public work.

NEW LISTINGS

The Modern, Streamlined Elevated Tank

32. A new 8-page bulletin describes the Watersphere, a modern elevated water tank of welded steel construction for general service gravity water pressure and fire protection. Construction details, illustrations of typical installations and table of standard sizes from 25,000 to 250,000 gallons capacity are included. Check the coupon. Chicago Bridge & Iron Co., 2115 McCormick Bldg., Chicago 44, Ill.

Eight Advantages of Vacuum Sludge Dewatering

189. Efficient sewage treatment requires economical sludge disposal. Eight advantages of vacuum dewatering of sewage sludge are described in a new folder issued by the Eimco Corp., Salt Lake City 8, Utah. Use the coupon for your free copy.

Helpful "How To Use" Section Aids Roller Selection

195. In addition to specification and illustrations of roller operation, the new Buffalo Springfield catalog features a special section to help in the selection of the right roller model for the job. Be sure you get top results from your roller selection by checking this helpful material. Use the coupon for a copy. Buffalo Springfield Roller Co., Springfield, Ohio.

How Armco Strength Helps Culvert Design

196. Loading problems of drainage structures may involve high dead loads, live load impact or strong disjuncting forces. A colorful new folder shows how flexible Armco corrugated metal structures meet these difficult job requirements. Get illustrated folder CMS-2650 from Armco Drainage & Metal Products, Inc., Dept. PW, Middletown, Ohio.

Preventive Maintenance Pays Dividends

208. A valuable 24-page booklet titled "Care of AC Rotating Equipment" designed to promote intelligent and consistent maintenance of electrical machinery is offered by Allis-Chalmers. This publication deserves careful study by everyone operating motors or designing motor installations. Use the coupon for your copy. Allis-Chalmers Mfg. Co., 1030 S. 70th St., Milwaukee, Wis.

Case Histories of Sidewalk Resurfacing

209. A very interesting brochure dealing with sidewalk resurfacing and waterproofing shows how easily applied "Plastic Rock" asphaltic concrete results in an attractive, non-skid wearing surface. Use the coupon for full information. United Laboratories, Inc., 16801 Euclid Ave., Cleveland 12, Ohio.

Chlorination for Large and Small Pools

210. Dependable chlorination is a necessity for all swimming pools, no matter how large or small. You can find out just how to protect your pool in the most dependable and economical way by using the coupon or writing Wallace & Tiernan Co., Inc., Box 178, Newark 1, N. J.

Helpful Chart for Reducing Valve Selection

126. Avoid common mistakes in specifying reducing valve sizes. A handy chart makes proper selection of reducing valves for air, water, etc. easy and accurate. Chart and Bulletin 148 available on request from Klippel Valves, Inc., 1000 Weller Ave., Hamilton, Ohio.

20 Questions and Answers On Sanitary Landfill

211. The advantages of sanitary landfill, factors in site selection, kind and size of equipment needed, labor requirements, capacity of a given site, land use on a sanitary fill and many other important engineering considerations are discussed fully in a bulletin prepared by the Trackson Co., Milwaukee 1, Wisc. Get Form 1084 for complete information on this important disposal method.

Helpful Chart Shows Use Of Coagulant Aids

212. Improved coagulation by the use of activated silica and coagulant aids is made easier by a helpful chart which correlates flow rates and silicate dosages with reacting chemicals, dilution volumes and alkalinities. Get this information from Philadelphia Quartz Co., Public Ledger Bldg., Philadelphia 6, Pa.

How Automatic Timers Help Plant Operation

213. Designers of new plants and improvements should consider the labor saving and dependable features of automatic timers which can easily replace manual operation of screens, pumps, and other units. Complete data on the timing unit, alternate wiring diagrams and installation suggestions from Midwest Automatic Control Co., 510 Third St., Des Moines, Iowa.

Facts and Figures on Pumping Power

214. Diesel power for every kind of pumping service is discussed in "Pump Power", a new booklet issued by the Caterpillar Tractor Co. Included is data and illustrations on water supply and construction pumping with diesel power, as well as other uses of interest to city officials and construction men. Just check the coupon for your copy. Caterpillar Tractor Co., Peoria 8, Ill.

Investigate This Plan For Garbage Elimination

164. A new presentation, written especially for municipal officials, offers a modern solution for the garbage disposal problem. Be sure you have this up-to-date information on the elimination of city garbage collection by the use of Hotpoint Disposal units. Check the coupon now. Hotpoint Disposal Department, 5600 West Taylor St., Chicago 44, Ill.

REFUSE COLLECTION AND DISPOSAL

New Unit Cleans Catch Basins in a Jiffy

34. Simple powerful pneumatic bucket is featured by Netco Catch Basin Cleaner. Folder 33A gives details and illustrates operation of complete self-powered truck-mounted unit. Netco Div., Clark-Wilcox Co., 118 Western Ave., Boston 34, Mass.

How to Lower Costs Of Refuse Collection

35. For saving trucks, labor and time in city rubbish collection get details of the new Dumpster-Kolektor described in literature just published by Dempster Bros., Inc., 996 Higgins, Knoxville 17, Tenn.

How You Can Improve Your City's Street Cleaning

162. The Austin-Western Model 4000 sweeper features three wheel design, front wheel steer, for easy maneuvering; rear broom to sweep dirt and refuse directly into 2-yd. hopper; built-in flushing device. Diagrams showing all operations and full specifications in Bulletin AD-2042, issued by Austin-Western Co., Aurora, Ill.

How to Reduce Cost of Garbage Collection

206. Lower costs for trucks, bodies, operation and maintenance are featured by the Pax All packer type year-round rubbish collector. Use coupon to get full details from St. Paul Div., Gar Wood Industries, Inc., 2207 University Ave., SE, Minneapolis 14, Minn.

An Incinerator Necessity

215. Recuperators featuring individual replacement of the heat transfer elements (silicon carbide tubes) for maximum accessibility and efficiency are described and illustrated in Bulletin 11 issued by Fitch Recuperator Co., Dept. PW, Plainfield Nat'l Bank Bldg., Plainfield, N. J.

CLIP AND MAIL TODAY

READERS' SERVICE DEPT.
PUBLIC WORKS MAGAZINE
310 East 45th Street, New York 17, N. Y.

Please send me the following literature listed in the Reader's Service Dept. of your June issue. (Circle catalogs you need.)

Booklets from pages 85-89:

20	22	24	25	26	27	29	32	33	34	35	37	38
42	44	50	52	61	63	64	67	68	73	78	81	82
83	91	93	94	95	96	98	100	102	103	105	106	108
109	110	113	120	122	124	126	131	133	137	140	142	143
148	149	150	152	153	154	155	158	161	162	163	164	165
169	172	175	180	187	189	190	194	195	196	197	198	201
204	205	206	208	209	210	211	212	213	214	215		

New Products, Pages 79-82:

6-1	6-2	6-3	6-4	6-5	6-6	6-7	6-8	6-9	6-10	6-11	6-12
6-13	6-14	6-15	6-16								

Name
 Occupation
 Street
 City State

THIS COUPON NOT GOOD AFTER JULY 31st

WATER WORKS

What You Should Know About Hypochlorination

20. This really helpful booklet tells you a lot about hypochlorination of water for small and medium sized supplies, swimming pools and main sterilization, and fully describes the application of manual and automatic "Chem-O-Feeders" for constant or proportional feeding of chemicals. Send for Bulletin SAN-8 issued by Proportioners, Inc., Box 1342, Providence 1, R. I.

Something Different! "Pipe Dreams" Full of Fun and Good Sense

22. The Universal Concrete Pipe Company will be glad to send you regular issues of "Pipe Dreams", their delightful pocket-size magazine full of American philosophy and good cheer. No cost or obligation. Just write Universal Concrete Pipe Company, Dept. PW, 297 South High St., Columbus 15, Ohio.

Makes Underground Pipe Installations Easy

23. One-man operated Hy-draulic Pipe Pusher pushes pipe through ground under streets, sidewalks, lawns and other obstacles. Pays for itself in man hours saved on first few jobs. For complete facts and prices, ask for booklet S-117, Greenlee Tool Co., Dept. PW, 2136 Twelfth St., Rockford, Ill.

Helpful Data on Hydrants

64. Specifications for standard AWWA fire hydrants with helpful instructions for ordering, installing, repairing, lengthening and using. Issued by M. & H. Valve & Fittings Co., Dept. F.W., Anniston, Ala.

Tested Jointing Materials

102. "Hydrotite" is a self-caulking, self-sealing joint compound for bell and spigot pipes. For data book and sample write Hydraulic Development Corp., 50 Church St., New York, N. Y.

Is Your City Metered 100%?

33. 100% metering as practiced by many cities requires accurate, dependable meters with interchangeable parts. Cut-away views of every part, capacity and size data are all included in handsome American-Niagara water meter booklet available from Buffalo Meter Co., 2920 Main St., Buffalo 14, N. Y.

Improved Clarification with Carter Circular Collectors

61. Latest 16-page bulletin on water and sewage equipment, No. 4906, gives complete data and specifications on Carter's three different types of clarifiers. A valuable working guide for every sanitary engineer. Ralph B. Carter Co., Dept. PW, 188 Atlantic Ave., Hackensack, N. J.

Radiophone Equipment for Two-Way Communications

68. Increased efficiency is available to all departments through the use of two-way Radiophone equipment. Full description of compact 30-watt mobile model, 30- and 60-watt base station equipment will be sent promptly. Write Raytheon Mfg. Co., Dept. 6460PW, Waltham 54, Mass.

All Electric Floatless Liquid Level Control

78. Description of operating principles and applications of B/W controls shows the simplicity and many uses of these all-electric, floatless devices. Diagrams of typical installations and engineering data all in bulletin 147 issued by B/W Controller Corp., Dept. PW, Birmingham, Mich.

Speedier, Space-Saving Purification Apparatus

81. A new 12-page bulletin, No. 2204, tells how the Spaulding Precipitator, in removing impurities from a liquid by precipitation, adsorption, settling, and upward filtration, occupies less space, uses less chemicals and speeds up treatment. Permutit Co., 330 West 42nd St., New York 18, N. Y.

Do Your Water Mains Need Cleaning?

38. Literature on Flexible method of cleaning water mains any size from 2" to 72", giving full details and list of nearest representatives in all parts of country. Address: Flexible Underground Pipe Cleaning Co., 9059 Venice Blvd., Los Angeles, Calif.

Flow Meters With Many New Features

91. The new Propello meter for main-line metering introduces many new features you will want to look into. Send for latest bulletin today. Builders-Providence, Inc., Box 1342, Providence 1, R. I.

Keep That Trench Pumped Really Dry!

92. To find out how well a Homelite Carryable Pump handles large volume, seepage, mud, write today for illustrated bulletin L-503 containing data of great value to all pump users. Write Dept. PW, Homelite Corp., 2110 Riverdale Ave., Port Chester, N. Y.

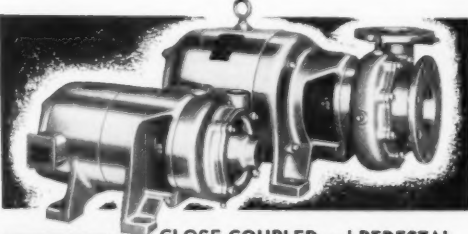
Painting Water Tanks For Longer Protection

94. High labor costs demand special consideration when painting elevated water tanks. This and other factors involved in proper paint selection are discussed in a bulletin issued by Jos. Dixon Crucible Co., Jersey City 3, N. J. Helpful specifications for repainting water tanks are also included.

Drain Any Standard Fire Plug Absolutely Dry in 60 Seconds

201. Here's a useful, new device its makers say will end backbreaking labor of draining frozen hydrants. Guaranteed to cut labor costs 50%. Simple and easy to operate. Just plug in air. Safe, economical, does job in 60 seconds. All bronze, non-corrosive. Get full details today from Jet Drain Engineering Co., Dept. PW5, 215 N. Fayette St., Saginaw, Mich.

New...Different THE "ALTA" LINE FOR INDUSTRIAL USE



CLOSE-COUPLED and PEDESTAL GORMAN-RUPP PUMPS

This new line of centrifugal pumps combines all the advantages of exact hydraulic engineering with best mechanical design.

Alta Pumps are outstanding in efficiency serving a capacity-head range up to 1000 G.P.M. and 200 feet head with 11 sizes, 1 to 4 inches.

Open as well as enclosed type impeller for slurry and other services.

For detailed information ask for
Bulletin 9-IP-11.

THE GORMAN-RUPP COMPANY
MANSFIELD, OHIO



EASY...ECONOMICAL WAY to stabilize slab sub-grade



KOEHRING MUD-JACK* pumps inexpensive soil-cement slurry under slab or into sub-soil . . . raises concrete slabs, stabilizes support . . . leaves firm, lasting sub-grade. Can cut your maintenance and repair costs 75% on alignment of sidewalks, curbs, gutters, driveways. Compact, portable No. 10 Mud-Jack (illustrated) handles city work fast . . . easy . . . with no inconvenience to public. Big, No. 50 Koehring Mud-Jack also available for extensive highway work. Write for complete Mud-Jack information, stating type of work you have in mind. Write TODAY.



*Trademark Reg. U. S. Pat. Off. K855.

KOEHRING COMPANY, Milwaukee, Wis.
Subsidiaries: PARSONS • KWIK-MIX • JOHNSON

Useful Data on Butterfly Valves

100. Complete descriptions and tables of dimensions on the full line of Rockwell Butterfly Valves is contained in several bulletins published by the company. Construction details and special control features are illustrated. Write W. S. Rockwell Co., 200 Eliot Street, Fairfield, Conn.

Well Water Systems Built to Last

105. Layne pumps are built for wells ranging from 4" to 36" diameter and in capacities from 50 to 16,000 gpm. Full engineering data and many installation views are given in 32 page Pump Bulletin 4-42. Layne and Bowler, Inc., Memphis, Tenn.

Pressure Pipe That Retains Capacity

106. Several bulletins describing the construction of pressure pipe, list of installations, carrying capacity tests, making service connections under pressure; and detail descriptions of several installations. Lock Joint Pipe Co., Box 269, East Orange, N. J.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa.

Do You Ever Have Leaks to Fix?

124. You'll want to know about the full line of "Skinner-Seal" clamps for repairing bell and socket joint leaks and broken mains. Step-by-step procedures are illustrated in catalog 41, a handsome 40-page presentation which shows applications of all fittings. Write M. B. Skinner Co., Dept. PW, South Bend 21, Ind.

All About Cement-Mortar Lining of Water Mains

133. Here, in a really beautiful booklet, is practically everything you need to know about this method of lining mains in place—the needs, methods, and results that will interest you. Centrine Corp., Dept. PW, 140 Cedar St., New York 6, N. Y.

Faster Pipe Laying With Preamolded and Threaded Joints

148. McWane 2" cast iron water pipe with threaded joints and precast bell and spigot pipe are described in folder WM-47. Additional data on 3" to 12" centrifugally cast pipe and fittings in folder WL-47, both issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala.

Helpful Data on Corporation Stops

161. A complete line of brass goods for water works: corporation stops, curb stops, service pipe couplings, goosenecks and other fittings are illustrated and described in catalog W-39, issued by A. V. McDonald Mfg. Co., Dubuque, Iowa. Get your copy for ready reference.

Fabrication with Everdur For Long-Range Economy

169. Corrosion-resistant Everdur alloys are available in all wrought commercial shapes suited for dozens of applications in water and sewage plants. Many examples shown in Publication E-11 issued by The American Brass Co., Waterbury 20, Conn.

How to Get Accurate Subsurface Information

172. For positive knowledge of sub-surface soil conditions an accurate sample is needed. The compact and complete Acker Soil Sampling Kit includes 12 soil and earth sampling tools. Get details in Bulletin 26, Acker Drill Co., Inc., Dept. PW, Scranton 3, Pa.

Handy Calculator for Cast Iron Pipe

175. With the handy Cast Iron Pipe Calculator you can determine at a glance the class, weight and dimensions of bell and spigot pipe. This slide-rule type calculator is absolutely free. Use coupon or write R. D. Wood Company, Public Ledger Bldg., Philadelphia 5, Pa.

Just Press the Button— It Does the Rest

103. Automatic Filter Operation. The Robotrol automatically back washes, rinses and returns the filter to service. Illustrated Engineering Bulletin 1230. Inflico Inc., 325 W. 25th Place, Chicago 16, Ill.

Find Buried Pipe The Goldak Way

131. Finding buried pipe is easy with the new Featherweight Goldak Pipe Locator. An easy-to-read illustrated bulletin tells the full story quickly. Address: The Goldak Co., 1544 Glenoaks Blvd., Glendale 1, Calif.

Easily Cleaned, Long Run Filter Bed Media

140. Bulletins on Anthracite tell the reasons why selected, graded crushed anthracite is superior to sand as a filtering material. Have you made a full investigation? Write Anthracite Equipment Corp., Wilkes-Barre, Pa.

Self-Priming Trash Pumps Work "High and Dry"

205. The maintenance difficulties of submerged trash pumps is avoided in the new non-clogging, self-priming trash type sump pumps described and illustrated in Form 9-ST-11, issued by The Gorman-Rupp Co., Mansfield, Ohio. Performance curves and specifications are included.

SEWERAGE AND WASTE TREATMENT

How to Keep Trenching Jobs on Schedule

24. The easy maneuverability of the tough, compact Cleveland Model 95 "Baby Digger" makes it well suited for the difficult job of trenching past the many obstacles of city and suburban work. Multiple digging and crawler speeds handle all soil types and trench widths up to 24". Get Bulletin S-52 from Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland 17, Ohio.

Design of Septic Tanks When Using Home Garbage Grinders

26. The use of a Youngstown Kitchens food waste disposer with a septic tank is thoroughly discussed in a new booklet released by Mullins Mfg. Corp. Tables show tank sizes for new construction, recommendations are made for improvements and better operation of existing systems, and a wealth of other valuable information is provided. For a free copy use coupon or write to Mullins Mfg. Corp., Dept. PW, Warren, Ohio.

How to Make Better Sewer Pipe Joints

37. How to make a better sewer pipe joint of cement-tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston Co., Dept. P.W., Adams, Mass.

Design Details for Sludge Collectors

42. Booklet No. P.W. 1982 on Link-Belt Circulating Collectors contains sanitary engineering data and design details. Catalog No. 1742 on Straightline Collectors, contains layout drawings, illustration pictures and capacity tables. Address Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia 40, Pa.

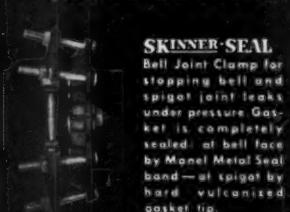
Standard Forms for Concrete Pipe

67. Concrete pipe for sewerage, drainage and culvert projects can be produced quickly and uniformly with Quinn Standard concrete forms. Data on forms for 12" to 84" tongue and groove or bell end reinforced pipe from Quinn Wire and Iron Works, 1621 12th St., Boone, Iowa.

Recording Meters for Parabolic Flumes

73. Engineering data on parabolic flumes and accurate companion meters for open flow water and sewage metering is given in Simplex bulletin 210. Installation data and calibration included. Write Simplex Valve and Meter Co., Dept. 4, 6750 Upland St., Philadelphia 42, Pa.

FOR REPAIRING BELL AND SPIGOT JOINT LEAKS...



SKINNER-SEAL

Bell Joint Clamp for stopping bell and spigot joint leaks under pressure. Gasket is completely sealed; of bell face by Monel Metal Seal band—at spigot by hard vulcanized gasket lip.

AND BROKEN MAINS

SKINNER-SEAL

Split Coupling Clamp. One man can install in 5 to 15 minutes. Gasket sealed by Monel band. Tested to 800 lbs. line pressure. A lasting repair. 2" to 16" incl.

M. B. SKINNER CO.
SOUTH BEND 21, INDIANA, U.S.A.

"GUNITE"

Construction, Relining, Repairing Of All Types Of Reservoirs



Add years of life to your structures. Saves time, money, materials. You owe it to yourself to investigate.

Write for our 48-page illustrated Booklet on "Gunite." It's free.

Our operations are nationwide.

PRESSURE CONCRETE CO.

"Gunite" Contractors and Engineers

193 Emmet St., Newark 5, N. J.
So. Court St., Florence, Ala.
33 No. La Salle St., Chicago, Ill.
Liberty Life Bldg., Charlotte, N. Car.

Engineering Facts About Transit Pipe

83. This compilation of Johns-Manville's "Engineering Facts" series presents concise, factual information about Transite's many economic and engineering advantages, and includes informative case histories plus dimensions and data for your files. Write Johns-Manville, Box 290, New York 16, N. Y., or use the handy coupon.

How Cities Can Do Complete Sewer Cleaning From Street

90. Literature illustrating how cities, towns and villages using OK Champion Sewer Cleaners are doing a complete sewer cleaning job from street level. Power machines available in addition to full line of sewer tools and accessories. Issued by Champion Corporation, 4752 Sheffield Avenue, Hammond, Indiana.

Complete Catalog for Engineers Shows Sewage Plant Equipment

110. A complete, 44-page catalog gives engineering data on Jeffrey equipment for water, sewage and industrial waste treatment plants including screening, screeners, grinders, grit collectors and washers, settling tank collectors, feeders, Floctrols, mixers and other mechanical equipment. Use coupon to get Catalog 775-A, Jeffrey Mfg. Co., Columbus 16, Ohio.

Underdrains—Hidden But Important Filter Components

113. For filter bottoms this firm makes "Armco" vitrified salt glazed floor blocks which provide ducts occupying 50% of the floor cross-section and air openings aggregating over 24% of the floor area. Described in several leaflets and data sheets. Ayer-McCae-Reagan Clay Co., Brazil, Ind.

Helpful Painting Chart For Sewage Plants

153. Specific data on surface preparation and priming, and a handy chart showing the proper type of paint for all surfaces and sewage plant conditions are included in new Bulletin No. published by Inertol Co., Inc., 480 Frelinghuysen Ave., Newark 5, N. J.

Need Low-Cost Air For Sewage Treatment?

122. New 20-page booklet shows operating and construction features of Rotary Positive Blowers engineered to fit your needs. Air for activated sludge, water treatment, constant vacuum for filtering. Bulletin 22-23-B-13 gives details. Roots-Connorsville Blower Corp., 504 Poplar Ave., Connorsville, Ind.

What You Should Know About Filter Underdrains

155. Specifications and construction details for the use of "Bosco" trickling filter floor underdrain blocks are available in literature published by Bowerston Shale Co., Bowerston, Ohio. Information on special fittings and angle blocks also included in 12-page booklet.

Data on New Single Stage Sludge Digestion Unit

163. High capacity mixing and ample gas storage space are provided in the new single stage digester type MA. Bulletin No. 6591 describes the unit and tells how it works. Photographs, drawings and useful tables of sizes and design data are included. Unit is available for tanks from 20 to 50 foot diameters. The Dorr Co., Barry Pl., Stamford, Conn.

Conkey Filters for Sewage Sludge Disposal

180. Development of Conkey sludge filters and applications to all types of sewage sludge are described in Bulletin 100. Tables show filter sizes, weights, and give average anticipated results. Write General American Transportation Corp., Process Equip. Div., 10 East 49th St., New York 17, N. Y.

Air for Activated Sludge and Other Aeration Processes

187. Quiet operation, high efficiency and compact size are features of the Chicago "Standardaire" positive displacement blower. Wide range of capacities available to fit your needs. Details and performance data from Chicago Pump Co., 2348 Wolfram Ave., Chicago 18, Ill.

STREETS AND HIGHWAYS

Levels Sidewalks and Curbs Quickly and Easily

29. How the Mud-Jack Method for raising concrete curb, gutter, walls and streets solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities—a new bulletin by Koehring Company, 3026 W. Concordia Ave., Milwaukee 10, Wis.

Latest Maintenance Equipment for Blacktop Roads

32. "Blacktop Road Maintenance and Construction Equipment"—Asphalt and tar kettles, flue type kettles, spray attachments, tool heaters, surface heaters, road brooms and rollers. This is modern and up-to-date equipment for blacktop airport and road construction and maintenance. Write for Catalog R. Littleford Bros., Inc., 452 East Pearl St., Cincinnati 2, Ohio.

Drill Concrete With Your Ordinary Electric Drill

32. Substantial cost-per-hole savings are claimed for Tilden Rotary Drills which penetrate concrete 2" to 4" per minute. Cutters can be resharpened. Available in sizes 3/4" to 4". Get full data from Tilden Tool Mfg. Co., 1995 N. Fair Oaks Ave., Pasadena 3, Calif.

Grading Can Be Faster, Cheaper and Easier

94. You'll like every feature of the Austin-Western 99H Grader. It has all-wheel drive, all-wheel steer, controlled traction, precision sideshift and a high lift, extreme reach, reversible blade. Get data from Austin-Western Co., Aurora, Ill.

Heating, Thawing and Melting With Hauck Burner Equipment

142. A newly released 16-page bulletin covers the complete line of Hauck heating and melting equipment. Data covers units for every water, sewer and street department purpose.

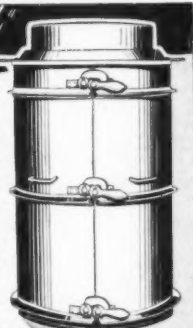
THE Quinn Standard FOR CONCRETE PIPE

The Quinn Standard is known as the best the world over, wherever concrete pipe is produced and used. Backed by over 35 years' service in the hands of hundreds of Quinn educated contractors, municipal departments and pipe manufacturers who know from experience that Quinn pipe forms and Quinn mixing formulas combine to produce the finest concrete pipe at lowest cost.

QUINN HEAVY DUTY PIPE FORMS

For making pipe by hand methods by either the wet or semi-dry processes. Built to give many years of service—sizes for pipe from 10" up to 120" and larger—tongue and groove or bell end pipe at lowest cost.

WRITE TODAY. Complete information, prices, and estimates sent on request.
Also manufacturers, QUINN CONCRETE PIPE MACHINES



QUINN WIRE & IRON WORKS 1621 12th ST. BOONE, IA



M-SCOPE PIPE — LOCATOR

Light Weight Model AB

Only \$149.50

Metal Cased Cabinets

Superior Performance

at Lower Cost

Pipe Finder — Leak Detector
Combination Type BL \$197.50

Free Illustrated Lit.

FISHER RESEARCH LAB., INC.

PALO ALTO

CALIF.

P.F.T. Presents HIGHER SAFETY STANDARDS



GET
THIS
NEW
BOOK

New Bulletin 221 describes the recent improvements in P.F.T. Gas Safety Equipment; for better protection for boiler rooms and other installations, and longer service life for the equipments.

All units are illustrated with detailed drawings. Specifications, typical gas piping arrangements and charts for selecting sizes are included.

P.F.T.

PACIFIC FLUSH TANK CO.
4241 RAVENWOOD AVE. CHICAGO
NEW YORK • LOS ANGELES
SAN FRANCISCO • DENVER
CHARLOTTE, N. C. • TORONTO

PLAN BETTER SEWER LINES

WITH WESTON

GASKETS and

FORMS for ALL

SEWER PIPE JOINTS



- No jute used—gasket centers spigot.
- Definite space in each joint for cement.
- Form confines cement-grout to lower portion of joint.
- Particularly advantageous in water-bearing trenches.
- Infiltration minimized.

L. A. WESTON CO.

ADAMS
MASS.

from "one-man" burners to large size portable kettles. A useful addition to your reference file. Get Bulletin 1068 from Hauck Mfg. Co., 117-127 Tenth St., Brooklyn 15, N. Y.

How to Save Time on Curb and Gutter Work

143. Every type of curb and gutter work is illustrated in the 12-page Heltzel catalog on steel forms for building concrete curbs, gutters and sidewalks. Time-saving setups show how to speed up the job and save money. Get your copy from Heltzel Steel Form & Iron Co., Dept. PW, Warren, Ohio.

Road Widening With Concrete, Bituminous Mix or Gravel

149. All types of road building materials are handled quickly and accurately by Aspeco Wideners. New illustrated bulletin shows operations on all types of widening strips, gives details on wideners and trench rollers. Issued by All Purpose Spreader Co., Elyria, Ohio.

Light Weight Machine Does Work of Heavy Roller

152. For compacting hot or cold patching material, be sure to investigate the Wayer Impactor. 2,000 blows per minute tamps, finishes and cures. All data in Bulletin 25-8. Wayer Impactor Sales Co., 12 No. Third St., Columbus 15, Ohio.

Useful Data for Highway Builders in Barrett Road Book

190. The latest edition of "The Barrett Road Book" has 54 pages of helpful tables and step-by-step outlines of highway maintenance and construction with Tarvia and Tarvia-lithic. Tables show quantities per yard and mile; aggregate gradings; costs; many others. Get this useful book from Barrett Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

Tractor-Mower Team Speeds Highway and Municipal Mowing

194. The John Deere Model "M" tractor and "M17" mower work as a team to keep highway shoulder and municipal mowing at the economical minimum and performance maximum. Full description of the two units, and complete specifications are in Bulletin A724, available from Deere & Co., Dept. PW, Moline, Ill.

Two-Way FM Radio Telephone Equipment for All Departments

197. The benefits of two-way radio communication for all departments of municipalities and counties make full information on this subject important to all engineers. For descriptions of Motorola FM systems, or for specific recommendations concerning your application write to Dept. PW, Motorola, Inc., 4545 Augusta Blvd., Chicago 51, Ill.

Helpful Data on Distributors For Bituminous Materials

198. Two models of pressure distributors featuring uniform pressure and temperature, accurate displacement pumping are covered in Bulletin K56145 and RS12046, available from Standard Steel Works, Dept. PW, North Kansas City, Mo.

POWER AND LIGHT

Using Sewage Sludge Gas For Power Generation

27. A new 8-page illustrated bulletin, No. 4811, describes Superior Dual Fuel Diesel engine operation and illustrates the simplicity of controls with fuel conversion by either push buttons or hand lever. Copies are available from Superior Engine Div., Dept. PW, The National Supply Co., Toledo, Ohio.

Air Cooled Engines for Hundreds of Applications

137. Tested under severest conditions of long, hard use, these engines have earned world wide recognition as the "right" power for hundreds of applications. Get latest bulletin from Dept. PW, Briggs and Stratton Corp., Milwaukee 1, Wis.

Low Cost Power From Dual Fuel Engines

154. Operating on the Diesel cycle, burning either oil or gas, the Worthington Super-charged Dual Fuel Diesels give high economies by running on the cheapest fuel available. Get complete data from Worthington Pump & Machinery Corp., Dept. PW, Harrison, N. J.

CONSTRUCTION EQUIPMENT

Speed Your Work With These Powerful Motor Graders

48. Two powerful Galion motor graders designed to answer every requirement for more speed in road, airport, dam and housing construction work are fully described in a folder illustrated with many action pictures. Issued by Galion Iron Works & Mfg. Co., Galion, Ohio.

How to Keep Your Loader On the Job

50. Don't take more time to move your loader to the job than to do the work. Investigate the Eagle Truck Mounted Loader for handling gravel, sand, cinders, snow from windrows or piles. Get forms 444 and 947 from Eagle Crusher Co., Inc., Galion, Ohio.

How to Pump Debris Laden Water

63. Bulletin 167-D describes the Novo lift-and-force diaphragm pumps which feature compact design, easily opened cleanout plate and triple-life diaphragms. 3" and 4" sizes handle water laden with large amounts of debris and abrasives, and containing large percentages of air. Copies from Novo Engine Co., Lansing 5, Mich.

52-Page Data-Packed Bulletin On Contractors' Pumps

95. Tables for pump size determination on every excavation job, pipe friction loss, attitude effects and lots of other valuable data are included in this comprehensive booklet illustrating the many Jaeger "sure-prime" pump applications. Get your copy (catalog P45) by checking our coupon or writing the Jaeger Machine Co., Dept. PW, Columbus 16, Ohio.

Folders Tell "Inside" Story Of Crawler Tractors

108. Performance-boosting and cost-cutting features of International crawler tractors are graphically presented in two new folders issued by International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill. Titles are "How Long is Your Tractor's Life Line" and "Is Your Horsepower Getting to the Track?"

International Trucks Are Built to Take It

120. Trucks take a pounding in construction work—that's why you need data on International Trucks that are engineered for your job. Check the coupon or write International Trucks, Dept. PW, 180 N. Michigan Ave., Chicago 1, Ill.

New 15,000 GPH Pump Weighs Only 57 Pounds With Engine

150. Together, the 5-HP engine and 15,000 GPH (250 GPM) pump just introduced by McCulloch weigh only 57 pounds. Pump has 28-ft. suction lift; 3-in. outlet and inlet; automatic governor. Get complete information in Bulletin 4960 from McCulloch Motors Corp., Dept. PW, Los Angeles 45, Calif.

Check "Gunite" Concrete For Every Application

158. Big 44-page book illustrates "Gunite" uses for both repair and new construction of sewers, tanks, dams, swimming pools, and all concrete structures. A multitude of applications. Be sure to check coupon or write Pressure Concrete Co., Dept. PW, 315 S. Court St., Florence, Ala.

Hydraulic Dump Bodies Feature Trouble-Free Hoist

165. Get data on Heil Twin-Arm hoists and bodies for 1½ to 2½ ton trucks and learn how reliable hoist and sturdy body will keep your truck in service with less repair and maintenance. Bulletin BH 4662-G gives details. The Heil Co., Dept. PW, 3090 W. Montana St., Milwaukee 1, Wis.

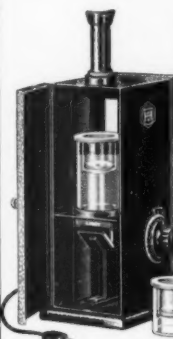
Versatile Wheeled Tractor Handles Countless Jobs

204. A new booklet on industrial wheeled tractors recently published by The Oliver Corp. covers the complete Oliver line. Many application photos show use of tractors with matched allied equipment such as bucket loaders, manure spreaders, blowers, mowers, brooms, etc. Get this bulletin, Form A-918, from The Oliver Corp., 19300 Euclid Ave., Cleveland 17, Ohio.

HELLIGE TURBIDIMETER

A TURBIDIMETER WITHOUT STANDARDS

Accurate • Foolproof • Universal



For MEASUREMENT OF TURBIDITY (S.O.) DETERMINATION OF SULFATE (S.O.) AND OTHER APPLICATIONS

WRITE FOR CATALOG No. 8000

HELLIGE

INCORPORATED

3718 NORTHERN BLVD. LONG ISLAND CITY 1, N.Y.

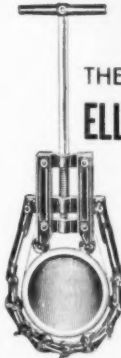
AMONG MEN WHO KNOW



THE ELLIS PIPE CUTTER

is Best

FOR CUTTING LARGE SIZES OF PIPE



No. O1 Cuts Pipe 4" to 8"

No. 1 Cuts Pipe 4" to 12"

Write for circular and price list No. 33PW. on a complete line of pipe cutting tools.

ELLIS & FORD MFG. CO.
FERNDAL 20, MICH.

ROTO-TROL

940

Write
for
Bulletin



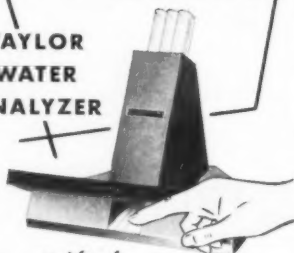
The 940 Roto-Trol will control your pumps, valves, alarm circuits, etc., all from one float. Each circuit is completely independent from all others, and may have several starting and stopping positions on both a rising and falling level. Can be set on the job. No special tools or experience required. All circuits, from two to ten or more, are made through snap action of mercury switches.

Water Level Controls Division of
HEALY-RUFF COMPANY

791 Hampden Ave., St. Paul 4, Minn.

IT'S COMPLETE

TAYLOR
WATER
ANALYZER



There's the Value!

pH, COLOR, MANGANESE, TOTAL IRON,
AMMONIA, CHLORINE, SILICA, NITRITE N,
NITRATE N, FLUORIDE, COPPER

Complete enough for the largest water treatment plants—inexpensive enough for the smallest. Set includes a color standard slide for each determination—liquid color standards are enclosed within the slide, thus, eliminating inconvenient, fragile single standards—the Taylor Liquid Color Standards carry an unlimited guarantee against fading—your assurance of permanent accuracy.

FREE REFERENCE BOOK

Write direct for this valued book "Modern pH and Chlorine Control"—96 pages of interest to water treatment engineers. Tells how Taylor sets are used throughout the industry. See your dealer for equipment.



W. A. TAYLOR AND CO.
7304 YORK RD. • BALTIMORE-4, MD.

WORTH TELLING . . . By Arthur K. Akers

We went out to the **Dorr Company** house-warming of their new Stamford, Conn., offices on April 27. A color movie of "The Dorr Way," and tours of the offices and the research laboratories at near-by Westport, made up the serious side. Later a few simple home remedies for housemaid's knee, parched throats, or whatever else ailed us were dispensed by a bevy of Dorrco beauties. A good job and a good time sums it up.

D. Birney Stokes, vice president, sales, of the United States Pipe and Foundry Company, announces these July 1 changes: **Carl N. Brown**, from Chicago to assistant general sales manager, at Burlington, N. J.; **Howard A. Hoffer**, takes charge of all export and eastern division sales; **J. Leslie Hart** is advanced to western sales manager, at Chicago; **Thomas B. Irwin** becomes Kansas City sales agent, vice **Harry D. Wade** who becomes assistant to Mr. Hart in Chicago.

A \$350,000 plant expansion of the Wayne Division of **Gar Wood Industries** is under way in Wayne, Mich. When completed, manufacture of such equipment as the Load-Packer refuse collection unit will be switched to Wayne from Highland Park.

No Gallup polls are needed when **E. H. Thwaits**, vice-president of **The Preload Corporation**, New York, runs for water commissioner on his native heath, Plandome, Long Island. Ed. went in originally with 9 votes. This year he won with an earth-shaking 17. In Plandome, that's practically election by acclamation.

Link-Belt Company, Chicago, has elevated **D. E. Davidson**, formerly general manager, to vice-president. **Eugene P. Berg** succeeds him as general manager.

Mack Trucks news includes naming of **A. F. Fenner** as general sales manager with headquarters in Chicago; **P. J. Degnon** becomes manager of the eastern sales division. **E. G. Ewell** is now general sales manager of the Eastern, Atlantic, and Southern sales divisions, in New York.

Speaking of clay pipe, nearly 70 manufacturers and representatives of the industry held a 3-day conference in Chicago in March. **National Fireproofing Company** of Pittsburgh, which recently converted its Brazil, Indiana, plant to the manufacture of clay pipe, was welcomed to the manufacturers group.



Mr. Feldmann

Walter H. Feldmann is new vice president in charge of sales for **Worthington Pump and Machinery Corporation**, Harrison, N. J.

Ray Cartwright is announced as the new manager of **The Standard Steel Works'** road equipment division, Kansas City, Mo.

Charles O. Evans has been appointed district representative for the sales of Galion motor graders and rollers in Washington, Oregon, Idaho, Montana, Utah, and Wyoming.

At **Fairbanks, Morse & Company**, **O. O. Lewis** has been elected vice president in charge of sales.

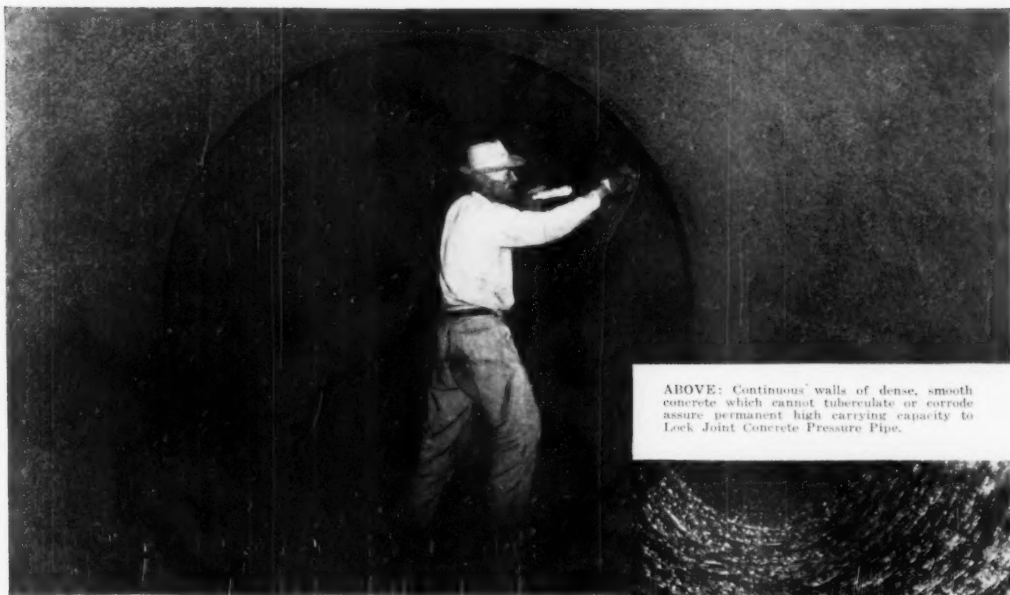
Allis-Chalmers news includes: **Otho V. Tally** announced as manager of their midwest region, at Chicago; and **R. D. Moody** manager of Los Angeles district, succeeding **C. W. Schweers** who becomes manager of the New England region, at Boston.

The Cataphote Corporation, Toledo, has built a new plant at Jackson, Miss., to expand their manufacture of glass beads and spheres for highway striping and traffic signs.

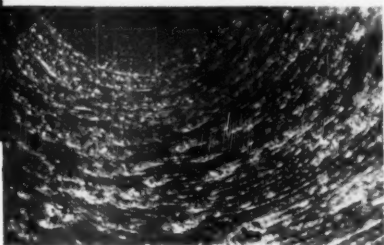
If we had seen **Tom Quigley**, advertising manager of **Wallace & Tiernan**, lately he would have told us this one. A New Jersey high-schooler clattered and smelled to a stop at a toll-bridge in his ancient jalopy.

"Fifty cents" said the toll-keeper. The boy handed him the keys. "Sold!" he said.

CONCRETE *is the answer to your main problem*



ABOVE: Continuous walls of dense, smooth concrete which cannot tuberculate or corrode assure permanent high carrying capacity to Lock Joint Concrete Pressure Pipe.



ABOVE: The tuberculated condition of this metallic pipe line reduces its carrying capacity by 50%.

Tuberculated mains—corroded mains—leaky mains—all cost municipalities, taxpayers and industry immense sums every year in added pumping costs, maintenance and repairs. Yet, by the use of Lock Joint Concrete Pressure Pipe, all of this unnecessary expense could be eliminated.

1. LOCK JOINT PRESSURE PIPE does not tuberculate . . .

RESULT { No excessive pumping costs
No periodic cleaning costs
No loss of income from inadequate delivery of water to the consumer

2. LOCK JOINT PRESSURE PIPE does not pit or perforate from electrolysis or corrosion

RESULT { No cost for major repairs
No cost for periodic patchwork
No loss of revenue while the line is shut down for emergency repairs.

Consider these facts when you plan your next water supply or transmission main and specify Lock Joint—the pressure pipe of perpetual economy.

Lock Joint Pipe Company for over forty years has specialized exclusively in the manufacture of reinforced concrete pipe for water supply and transmission mains as well as for sewers, culverts and subaqueous installations.

LOCK JOINT PIPE COMPANY

Est. 1905

P.O. Box 269, East Orange, N. J.

PRESSURE PIPE PLANTS: Wharton, N. J., Turner, Kan., Detroit, Mich.

BRANCH OFFICES: Casper, Wyo. • Cheyenne, Wyo. • Denver, Col.
Kansas City, Mo. • Valley Park, Mo. • Chicago, Ill. • Rock Island, Ill.
Wichita, Kan. • Kenilworth, N. J. • Hartford, Conn. • Tucumcari, N. Mex.
Oklahoma City, Okla. • Tulsa, Okla.



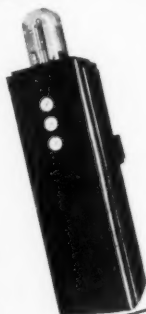
R_Y CHLORINATION by **WALLACE & TIERNAN**

Ingredients:

*35 Years' leadership in the art of chlorination.
Able, alert, research and engineering personnel.
Modern, completely equipped manufacturing facilities.
A nation-wide service organization.*



**Program Controlled
Visible Vacuum
Chlorinator**



**Visible
Vacuum
Chlorinator**



**Air-operated Master
Visible Vacuum Chlorinator**

PROVEN PRESCRIPTION

against

**ODORS
SLUDGE BULKING
CYANIDE WASTES
FILTER FLIES
HIGH B.O.D.
GREASE
UNSTABLE EFFLUENT
BACTERIA**

Chlorination for sewage ills is a sure-fire treatment, as the men who know best—the sewage plant superintendents—will tell you.

For example, Mr. Ralph Hoot, Superintendent of Sewage Treatment at Fort Wayne, recently reported: "****We have been most thankful for our automatic chlorine control equipment. It has done its job well."

Such comments from experienced superintendents like Mr. Hoot are typical. Chlorination by Wallace & Tiernan has proven itself by actual use in thousands of installations all over the country. It can help **your** sewage treatment, too, at an initial cost that averages only 1% of total plant investment. This original low cost, coupled with the more effective plant operation that chlorination makes possible, results in a buy that dollar-wise superintendents can't afford to overlook.

Find out **now** about this modern aid to sewage treatment, specifically engineered to your individual needs by Wallace & Tiernan. A call to your nearest Wallace & Tiernan Representative will bring you full details.

WALLACE & TIERNAN COMPANY, INC.

CHLORINE AND CHEMICAL CONTROL EQUIPMENT
NEWARK 1, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES